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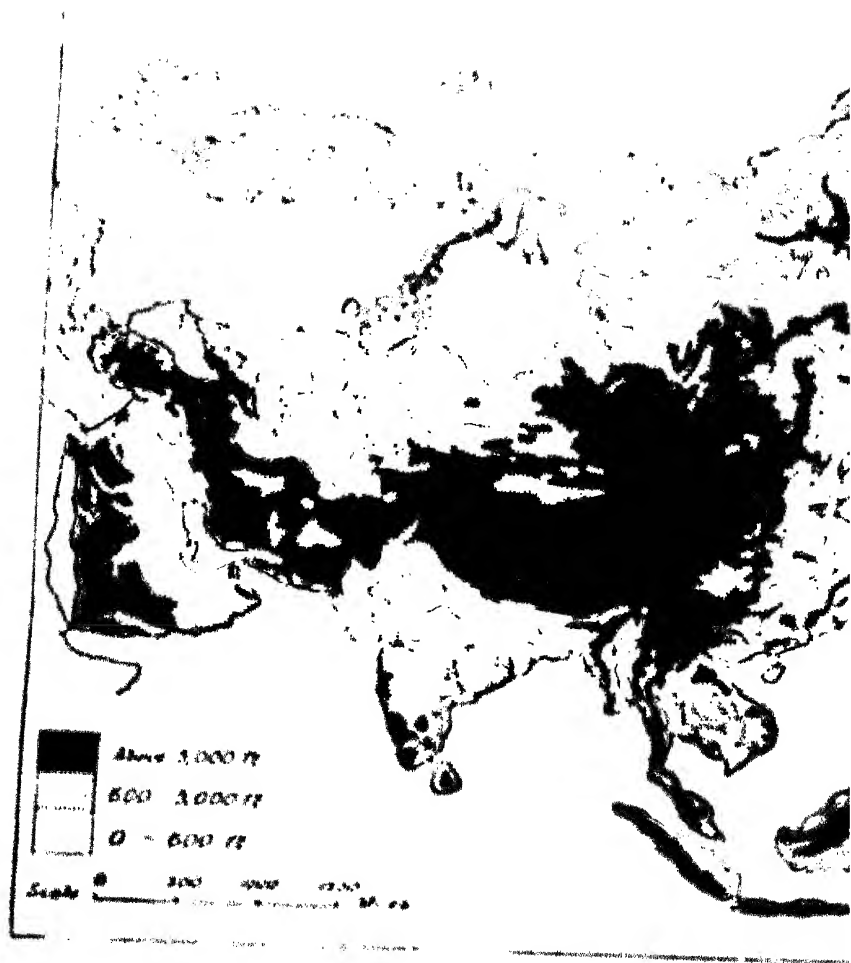
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**ASIA—THE MOUNTAIN HEARTED**  
**UNIQUE AMONG CONTINENTS**



# ASIA

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## A REGIONAL AND ECONOMIC GEOGRAPHY

BY

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G. F. CKLD 1963

WITH 172 MAPS AND DIAGRAMS



THIRD EDITION, ENLARGED AND PARTLY REWRITTEN



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TO  
MY WIFE  
IN MEMORY OF BULLOCK-CART DAYS  
AND IRRAWADDY NIGHTS



## PREFACE TO THE THIRD EDITION

**A**LTHOUGH it is only six years since the appearance of the first edition of this book—followed eighteen months later by the second—so much has happened in the intervening time that it has proved essential to rewrite completely many sections. In the first place events in China, Manchuria and Japan have considerably altered the picture of the Far East and the passage of what will probably in the future be called the Great Depression has affected in very different ways the progress of development in Asiatic countries. In the second place the results of many detailed geographical studies have been published in the last decade. American geographers have been the outstanding leaders in this work—G. T. Trewartha, R. B. Hall, D. H. Davis and J. E. Orchard in the case of Japan; J. W. Coulter and J. W. Baylor in Korea; E. E. Ahnert, Owen Lattimore, and G. T. Trewartha in Manchuria; G. B. Cressey in China. The study of geography has assumed an ever-increasing importance in both Japan and China and the wealth of material is gradually being made available to non-Oriental readers. In the third place it has been desirable to alter somewhat the balance of the book. It was natural that, in the first edition, India should bulk largely as being the scene of my own work during five years of residence and as being of paramount importance to British readers. But Japan has become increasingly significant in world affairs and has now been accorded a fuller treatment. America is even more intimately concerned with the development of Japanese and Far Eastern affairs and the popularity of this book in America affords a further justification for the complete recasting of this section. Twelve months in America in 1933-4 enabled me to discuss many of the problems at first hand with those who have undertaken their investigation, and I gratefully acknowledge all the help thus received during the most stimulating and delightful year of my geographical education.

The selection of material and its presentation in this book have resulted in interesting discussions on several occasions regarding the nature, content and scope of geography. In a world which is of necessity becoming increasingly international

we are inevitably forced to learn something of the life of other man in the other country. It must be the function a geographical training to enable disconnected fragments knowledge to be put into their proper places in a connected, intelligible picture of the whole. Geography is thus a discipline and a point of view or mode of thought. In content it deals with the natural environment, the earth viewed as the home of man, the stage on which man plays his part and with the interactions between man and his environment considered dynamically and not statically—that is with the sequence of human occupation.

Whilst the environment is a living and connected whole it can be analysed into its component parts, and each of these parts may be considered *per se* or as they influence the life of man. In the latter sense they may be called the geographical factors, and in the consideration of any area large or small the geographical factors group themselves into (a) those which are related to the position of the area relative to the world as a whole and to neighbouring areas; (b) those which are related to the physical build of the area—the influence of land and sea, mountain and plain; (c) those which are related to the geological structure of which physical features are but the outward visible evidence; (d) those which are related to weather and climate; (e) those which are related to vegetation, itself an index of the interaction of the preceding factors; and (f) those which are related to animal life, so largely dependent upon vegetation. In a primitive world the influence of each of these factors upon the life of man could be considered in sequence, but man has himself altered his environment so that each geographical factor is more appropriately considered not only as it influences human life but as man has reacted to and altered that influence. Thus the occurrence of minerals and their exploitation is appropriately considered with geological structure; the influence of natural vegetation cannot be divorced from a consideration of the vegetation as altered by man.

In an area so vast and so diverse as Asia no apology is needed for taking the great political units—which are, in so many cases, geographical entities also—as the basis of description in the second and larger part of this book. In each case the treatment varied according to special requirements, follows the scheme already outlined. Introductory details are followed in order by a consideration of physical features; geology, structure and minerals; climate; vegetation and agriculture. Then comes the consideration of man himself, his activities, his industries and trade.

In all the larger political units of Asia, the environment varies

greatly from one part to another. Hence the necessity for the division into regions. I have called my regions 'natural regions' because they are in the main delineated by natural features of topography, structure, climate and vegetation. But each, in the course of the long occupation by man, has been changed, some in small measure, others very greatly. Features, such as the character of agriculture, which are the result of man's activities in many cases have become the obvious or outstanding ones of the region, but in so much as these secondary characteristics have been made possible by the fundamental or natural ones the regions remain 'natural'. Others prefer the term 'geographical region'. My regions are, in fact, environmental regions and I make no apology for the fact that the outstanding characteristics of some of them to-day are the direct results of human occupance. I contend, however, that they are fundamentally important in helping us to understand the life of man under conditions different from those of our own home environment.

In the preparation of this edition I have been helped by Mrs. E. Beaver, B.A., whose work I gratefully acknowledge. I have again followed in the spelling of place-names the lists issued by the Permanent Committee on Geographical Names of the Royal Geographical Society. I have continued to follow the course of selecting references which are intended mainly as a guide to the student and general reader seeking further sources of information. They are, therefore, almost restricted to books and periodicals likely to be readily available; as far as possible they are to works in the English language except where French or German publications fill a gap which could not otherwise be occupied. My special thanks are due to the American Geographical Society of New York for permission to reproduce a number of maps from the pages of the *Geographical Review*.

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LONDON SCHOOL OF ECONOMICS

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# ASIA

## PART I

### THE CONTINENT OF ASIA

#### CHAPTER I

#### THE OROGRAPHY OF ASIA

THE continent of Europe is frequently referred to as a peninsula of the larger land mass of Asia, a description which is readily confirmed by a glance at a map. So opens that geographers and geologists who have studied the appendage have attempted, in the past, to apply the learnt to the interpretation of the structure of the main

It is to such explorers and geographers as Prince Gortchakoff that we are indebted for pushing to the fore a somewhat different outlook. The basal structure of Asia is different from that of the remaining continents: moreover, as the principal mass of the globe, Asia deserves to be studied *de novo*. The heart of Asia consists of a great series of lofty plateaus, crossed by mountains and flanked on north and south by wide plains; a statement which cannot be made of any other continent. Unlike the great mountain chains of Europe and the Americas, those of Asia do not act as the main water parting of the continent, and the supposition that a water parting may be formed by a mountain chain is responsible for the inclusion on maps of Asia of numerous mountain chains which have no existence in fact.

The inaccessibility and the comparative uselessness of the heart of Asia have long hindered its exploration—with two results. In the first place, the detailed structure of the interior is imperfectly known, and it is impossible definitely to confirm or to refute theoretical reconstructions of the build of the continent. In the second place, the wide unknown spaces of the heart of Asia have been a convenient hiding-place for

many of the mysteries which still puzzle scientists. Stages in the evolution of mammalian groups which have been difficult to understand have been inferred to have taken place in Central Asia: the evolution of Man himself has been, with good reasons it is true, relegated to the mountain-girt fastnesses of the interior of the great continent.

Exploration is slowly but surely clearing away the mists:

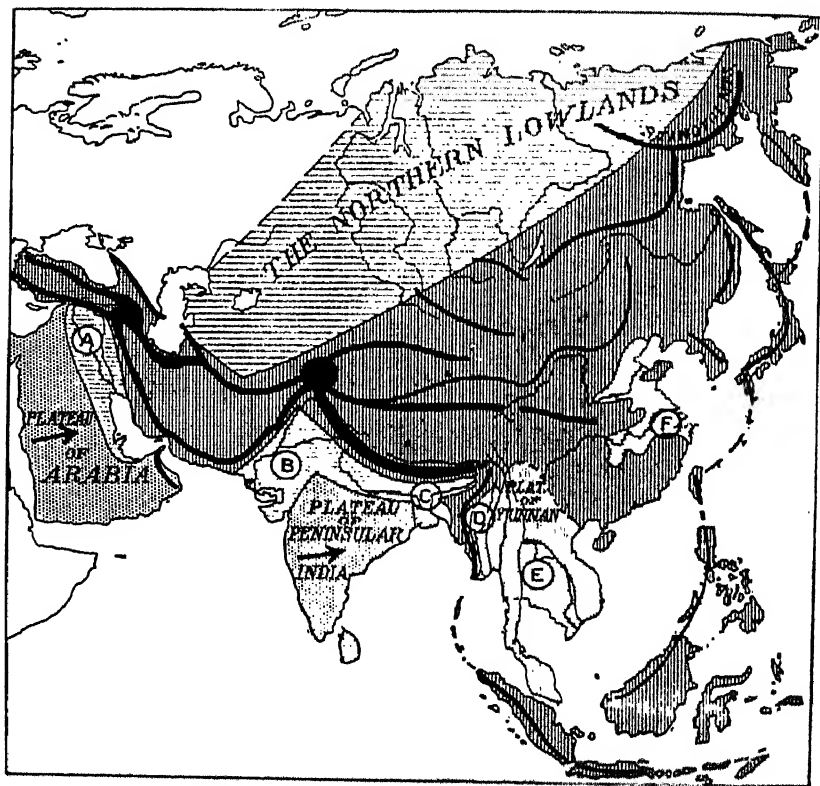


FIG. 1.—Structural sketch-map of Asia.

great expeditions like that of the American Museum of Natural History show, however, how much remains to be done.

This survey of the geography of Asia may be begun by attempting to summarize very briefly what is known of the orography of the continent, leaving considerations of underlying geological structure to a later stage.

In broad outline Asia consists of a number of great physical units.

There is a great central triangle of plateaus of varying elevation, buttressed by huge mountain chains, which occupies part of the continent. The Pamir Knot to the north-west forms the western apex of the triangle: the northern lies in the north-east of the continent: the south-eastern in the interior of China.

A second series of plateaus stretches from the Pamir through Afghanistan, Persia and Anatolia. These two of plateaus entirely separate the north-west of Asia from south and east.

A great lowland triangle occupies the whole of Asia to the north of the central mountainous triangle and forms the greater part of Siberia.

The east of Asia is occupied by a series of lowlands, intersected by mountain spurs and flanked on the outside by a long and complicated succession of fold mountains, arranged in long ranges.

In the south of Asia are three large plateaus—those of the Indian Peninsula, Peninsular India and Indo-China—separated from the central triangle by a series of river-plains—the plains of the Indus-Euphrates, Indus-Ganges-Brahmaputra and Irrawaddy. These five units may now be considered separately. Some time ago an excellent summary—which has since become a classic—of the orography of Asia was given by Prince Kropotkin<sup>1</sup> in the first part of his paper will be utilized in the following pages.

**The Plateaus of Central Asia.** The high plateaus of Central Asia occupy more than a fifth of the whole surface of the continent. It is scarcely correct to refer to the interior of Asia as a 'plateau', since it consists of a series of plateaus of various altitudes. The plateaus have their mountain ridges generally above the general level, and also have their high, in some cases gigantic, border ranges. But the depressions on the interior surfaces rarely sink to the level of the lowlands; generally the lowest parts are still 2,000 or 3,000 feet above sea-level; the chains of mountains, although rising to high absolute elevations, are still relatively low, as one foot is upon the level of the plateau. On the north-western borders several broad valleys are cut into the plateau-mass 'like gigantic railway cuttings, leading with an imperceptible gradient from the lowlands to the plateaus'. The plateau regions of Central Asia offer such variety of scenery as do fold ranges. 'Unvaried monotony—monotony of orographical features, climate, flora and fauna—remains the distinctive feature of the plateaus over the whole of Asia', *Geographical Journal*, February-March,

immense distances. Over thousands of miles the traveller finds the same broad and open valleys, the same harsh climate, the same species of plants and animals, the same unfitness for agriculture.'

Taking the plateau triangle as a whole, it is fringed or bounded by a succession of mountain ranges. On the south is the Himalayan Chain; forming the south-west corner is the Pamir Knot or the Pamir Plateau. Along the north-west border aligned obliquely to the general edge of the plateau are the Tien Shan, the Altai, Sayan, Barguzin, North Muya, and the Konam mountains. Along the eastern and south-eastern borders are the Great Khingan 'Mountains' which pass northwards into the Stanovoi 'Mountains'. In the south-east the structure is complex and obscure.<sup>1</sup>

The plateaus of Central Asia do not fade into one another, but are usually separated by well-marked ranges. They form a series of level basins, often quite cut off from one another. It is therefore simplest to consider the separate plateaus by studying in the first place the arrangement of the ranges. The Asiatic mountain system may be considered as grouped around the Pamir Plateau, 'the roof of the world'. From this great Knot huge chains are given off in four main directions:

- (a) To the south-east is the Himalayan Chain, reinforced on the north by the Karakoram.
- (b) To the east is the Kunlun.
- (c) To the north-east is the Tien Shan.
- (d) To the north-west are the Trans-Alai, Alai and Hissar Mountains.
- (e) To the south-west is the Hindu Kush.
- (f) To the south-south-west lie the mountains of Gilgit and the Sulaiman Mountains.

Each of these great chains may be followed further.

(a) The Himalayan Chain sweeps in a great curve along the north of India and into China. What happens structurally to the folds is one of the chief problems of Asian geography. Perhaps the folds continue across the high plateau of Western China into one of the great chains of China; possibly the folds are, as it were, redoubled on themselves and form the great chain between India and Burma. The latter line is continued through the Andaman and Nicobar Islands, Sumatra and Java into the festoons of mountains of the East Indies generally.

(b) The Kunlun itself passes south of the Tsaidam Swamp

<sup>1</sup> On this vexed question see F. Kingdon Ward, 'The Mekong-Salween Divide as a Geographical Barrier', *Geographical Journal*, Vol. LVIII, 1921, pp. 49-56; also the work of the Gregories (see p. 391).



eventually into the Tsinling Mountains of China, but the Tagh, which really forms its northernmost range, passes eastwards into the Nanshan or Southern Mountains of China.

) The Tien Shan pass eastwards into the Pei Shan or Northern Mountains of the Chinese; mention must also be made of their western extensions into Russian Turkistan.

) The Trans-Alai, Alai and Hissar Group fade into the mountains of Russian Turkistan.

) The Hindu Kush continues westwards along the northern base of the Elburz Mountains after having given off a great branch which becomes the Caucasus. The Elburz

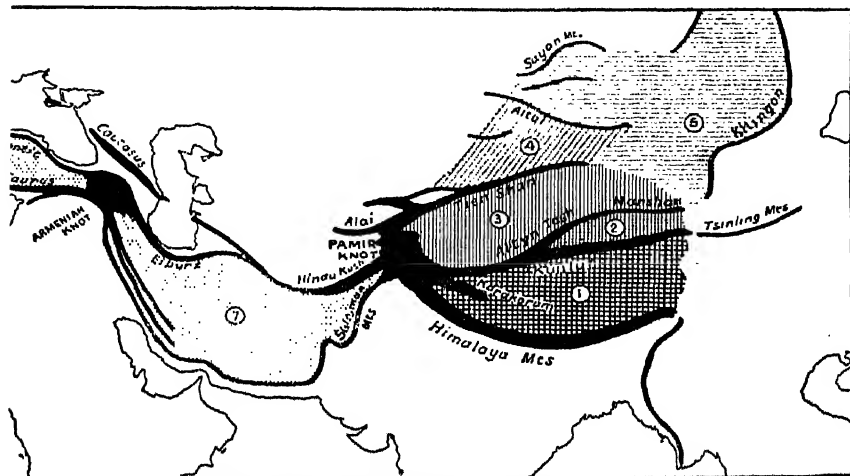


FIG. 2.—The central mountain complex of Asia.

Legend:—1. Tibet; 2. Tsaidam Basin; 3. Tarim Basin; 4. Dzungarian Basin; 5. Gobi Plateau; 6. Anatolian Plateau. The Vitim and Aldan Plateaus (6 of the text) lie to the west of the map.

into the Armenian Knot and are then continued along the coast of Asia Minor as the Pontian Ranges.

) The Sulaiman Mountains are continued to form the Arabian Hills and the bounding ridges of the Seistan-Iran Plateau on the south, then as the Zagros system to the Armenian Knot, passing then as the Taurus Chain along the coast of Asia Minor.

These chains are followed much more easily in Fig. 2. The plateaus may be regarded as basins lying between these ranges.

) The Plateau of Tibet is the loftiest of them all, and is bounded by the Himalayas or Karakoram on the south and Kunlun on the north.



- b) Higher Terrace: 3,000 to 5,000 feet, including the north-eastern plateaus, Vitim and Aldan Plateaus.
- c) Lower Terrace: 2,500 to 3,500 feet, including the Tarim Basin, Dzungarian Trench and the Gobi.

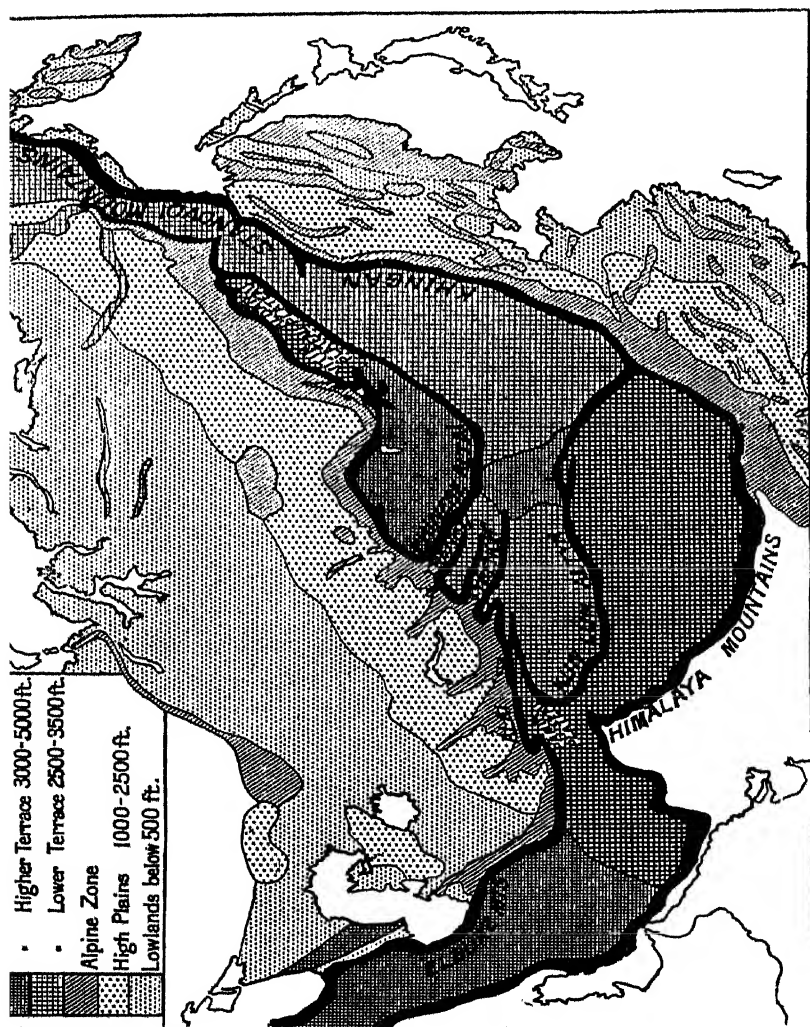


FIG. 4.—Kropotkin's conception of the structure of Asia.

since Kropotkin's scheme must be modified in view of knowledge, but the main features are reproduced as a, because of their historic value.

**The Plateaus of Western Asia.** The mountain chains

which bound these tracts on the north and south have already been mentioned, and it remains to note the basins or plateaus—Seistan in Afghanistan and Baluchistan; Iran in Persia; and Anatolia in Turkey or Asia Minor.

**The Great Lowland Triangle of the North-West.** When examined more carefully, it is very evident that the whole of this area must not be regarded as a great plain. In the section on Siberia we shall analyse its component parts with some care, but we may note here that Siberia alone consists of at least three main parts:

- (a) Western Siberia is a true lowland, bounded on the west by the low range of the Urals.
- (b) Central Siberia is of the nature of a low dissected plateau.
- (c) Eastern Siberia is a complex of hills and plains as yet still imperfectly known.

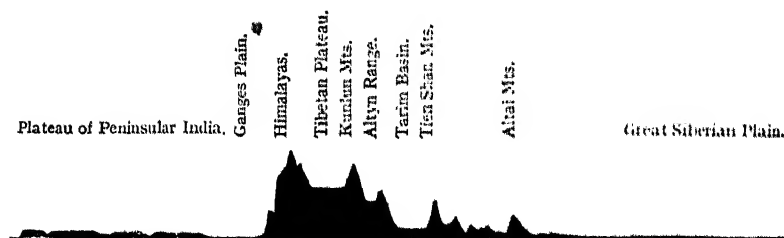


FIG. 5.—Diagrammatic section across Asia from south to north; from Cape Comorin in India to Cape Chelyuskin in Siberia.

In addition there is, along the borders of the central plateaus, a belt of what Kropotkin called high plains edged by an alpine zone. South-west of the lowland triangle, in Russian Turkistan, distinct hill ridges separate a number of basins bordering the main Aralo-Caspian depression.

**The Lowlands and Mountain Festoons of Eastern Asia.** The great lowlands of Eastern Asia are the river plains of the Amur, of Central Manchuria, of the rivers of North China; of the Yangtze Kiang in Central China, of the Si Kiang in South China, of the Mekong in Indo-China and of the Menam in Siam. Of the spurs of ancient mountains which separate these basins and the curves of more recent mountains which guard them on the Pacific side, we will speak later.

**The Plateaus of Southern Asia.** These plateaus include two which are particularly well defined—those of Arabia and Peninsular India. Each has a general slope from south-west to north-east and merges gradually into great plains—the plains

Tigris and Euphrates in the one case and of the Indus Ganges in the other. The third plateau, that of Yunnan and the Shan States of Burma and China, is less well defined.

Before leaving the orography of Asia we must refer to the drainage. Asia falls into four main drainage areas—the Arctic, Atlantic, Indian Ocean drainages and the areas of inland drainage. The consistent way in which nearly all the rivers rise on the great chains and rise on the surface of the central plateau, where their sources are separated from one another by very insignificant barriers, is worthy of special note.

The rivers flowing to the Arctic Ocean—Ob, Yenisei and Lena—have but short upper courses amongst the mountains of the central complex and very long courses across the plains. Their mouths and lower courses are frozen over in the winter months; the middle courses thaw before the mouths are free, with the result that in the spring the rivers flood enormous areas of their broad open valleys. The rivers flowing to the Indian Ocean have much longer courses on the plateau and generally pass down through a series of basins—as does the Yangtze—before reaching the ocean. The chief are the Amur, Ganges, Ho, Yangtze, Si Kiang and Mekong. Several of them are valuable highways, but all have rapids.

The great rivers flowing into the Indian Ocean rise beyond the first rampart of mountains; they are all of them snow-fed and come down in flood in summer. In all the drier regions they provide important sources of water for irrigation. These include the Salween, Irrawaddy, Brahmaputra, Ganges, Tigris and Euphrates.

## CHAPTER II

### THE STRUCTURE OF ASIA

**T**HE orography of Asia is naturally determined by the underlying structure, and one should, theoretically, consider the two together. But orography is a matter of surface surveying; the determination of structure demands a more intimate examination, one which probes beneath the surface. Whilst, therefore, the general character of the surface of Asia is comparatively well known, authorities differ widely in their conception of its structure. The two have therefore been divorced; the foregoing chapter dealt in the main with ascertained facts, the present chapter enters, quite frankly, the realm of theory.

**General Facts.** In the first place there are certain features in the broad structure of Asia upon which there is general agreement. We may divide the structural units into four groups:

- (a) The ancient blocks of the south, believed to have formed part of the old continent of Gondwanaland. They consist of a great complex series of pre-Cambrian rocks, highly folded and metamorphosed in the pre-Cambrian period and which have formed 'stable blocks'. Later sediments lie spread on their surface and occupy hollows, showing that the blocks have undergone changes of elevation, but they have been resistant to folding, and the sediments, where present overlying the ancient foundation, are but slightly disturbed. There are now two of these stable blocks, Arab-Asia and Peninsular India. Both blocks now slope towards the north or north-east and are there covered by alluvium of the Tigris-Euphrates in the one case and the Indus-Ganges-Brahmaputra in the other.
- (b) The ancient blocks of the north, generally similar in character to those of the south. One of these blocks, though it does not lie in Asia, is profoundly important in a consideration of the structure of Asia, and that block is the Russian Platform, underlying practically the whole of European Russia. A similar block, the exist-

ence of which seems to be generally agreed, and to which the name Angaraland has been given, occupies practically the whole of the plateau of Central Siberia. Argand, as will be noted later, believes that two other ancient massifs exist, one underlying the Tarim Basin (Serindian massif) and one underlying the plains of Northern China and Manchuria (Chinese massif).

- A conspicuous series of fold ranges—including the greatest ranges of Asia—which were formed at a comparatively recent date in the earth's history, during the period of the great Tertiary or Alpine earth-movements. The Tertiary Fold Ranges of Asia include the mountains of Asia Minor, Armenia, Persia, Baluchistan and Afghanistan, the great ranges of the Himalayas and Karakoram, the fold ranges of Western Burma and all the great festoons of mountains of Eastern Asia.
- ) The fourth division comprises all that is left—consisting mainly of sedimentary rocks of Palæozoic and Mesozoic ages; folded by pre-Tertiary and especially by the Caledonian movements, which took place at the close of the Silurian and in the Devonian periods, and the Armorican or Hercynian movements of late Carboniferous and Permian times,<sup>1</sup> as well as by movements in the Mesozoic period, more characteristic of Asia than of Europe. These older fold ranges have often cores of old rocks; they are often separated by minor stable blocks of varying character. Some of the latter are of great size—notably that of Southern China.

**Argand's Conception of the Structure of Asia.** The Swiss geologist Émile Argand read a paper before the International Geological Congress at Brussels in 1922 entitled 'Lectonique de l'Asie'.<sup>2</sup> The paper created a great deal of stir, not only because of the author's interpretation of the structure of Asia, but also because of his novel ideas on tectonics in general. It is impossible here to enter into the details, and in the summary which follows certain considerations from M. Argand's thesis have been introduced to make clear his general position.

<sup>1</sup> Perhaps it is unwise to refer to 'Armorican' or 'Hercynian' movements in Asia since their importance is doubtful. But these movements are significant in Europe, that it seems probable they had a counterpart in Asia.

<sup>2</sup> *Comptes rendus de la XIII<sup>e</sup> Session, Congrès géol. intern., Vol. I, 1-372.*

Fig. 6 has been simplified from Argand's diagrammatic tectonic map of Asia. It will be seen that he distinguishes—

- (a) Two old platforms, of pre-Cambrian rocks, in the south (Arabia and India).
- (b) Four old platforms, of pre-Cambrian rocks, in the north (the Russian Platform, Angaraland, the Serindian and Chinese massifs).

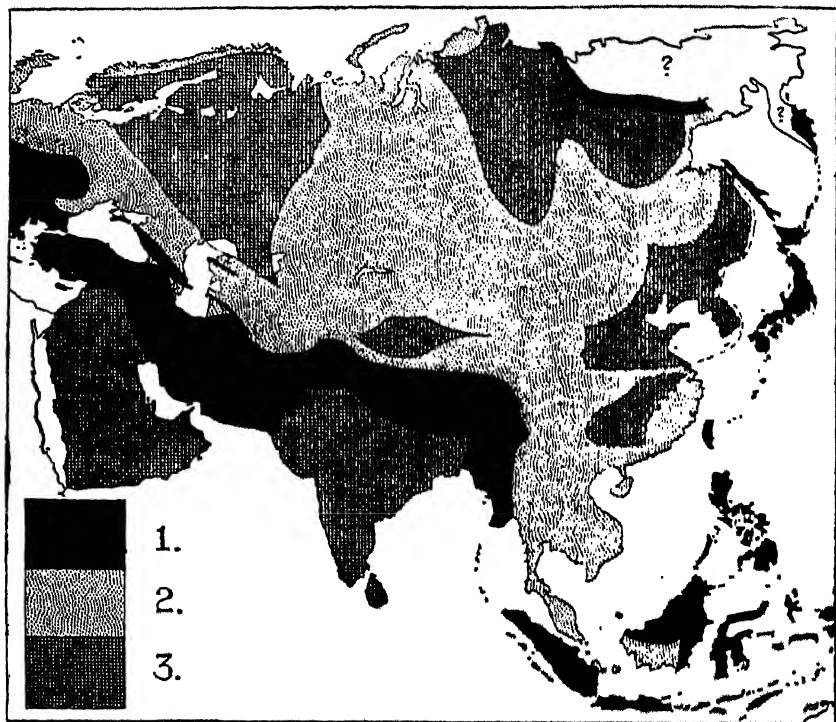


FIG. 6.—The structure of Asia, simplified from Argand.

1. Tertiary folded belts ; 2. Regions of post pre-Cambrian and pre-Tertiary folding ; 3. Ancient blocks.

- (c) A broad belt, shown in black, of alpine or tertiary folds (*chaînes géosynclinales et chaînes liminaires du cycle alpin*).
- (d) Large areas consisting mainly of palæozoic sediments and folded before the Alpine movements took place.

Here we must diverge for a few moments into certain matters affecting the earth's structure as a whole. It is probable that the original crust of the earth consisted of two concentric shells : an outer lighter shell with roughly the composition and character of granite, and an inner heavier shell with roughly the composi-



1 character of the well-known volcanic rock basalt. Or  
er shell may have been discontinuous and the original

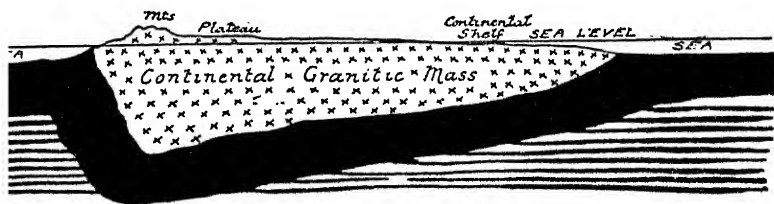


Diagram of a Continental Granitic Mass floating on a substratum of  
ltic material (in black). Below the latter there may be another layer  
e Peridotite.

(After Holmes and others.)

ntal masses like gigantic icebergs of granite floating in  
f basalt. The processes of denudation and sedimentation,

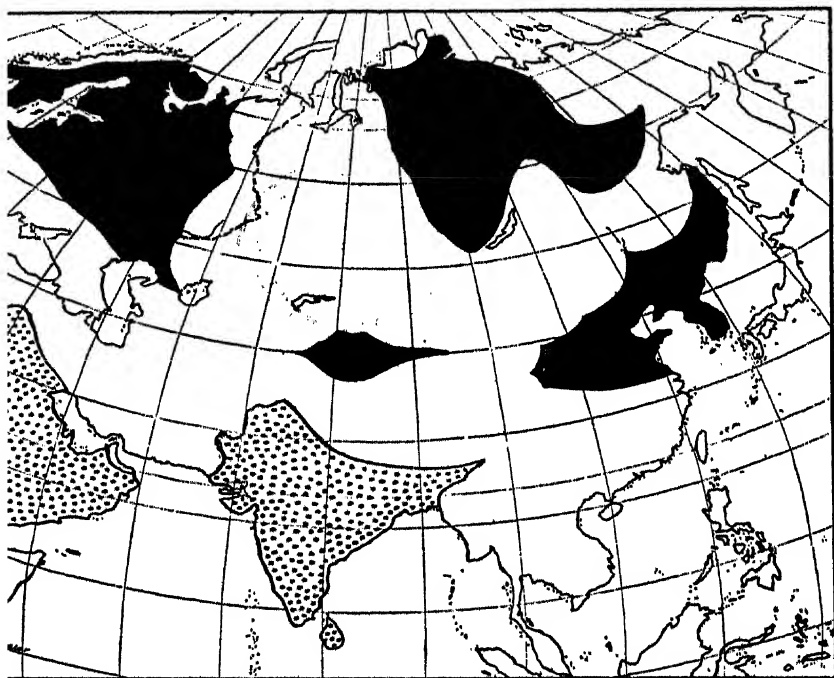


FIG. 8.—The old elements in the structure of Asia.

argand.) In black, the old massifs of the north ; dotted, the remnants of Gondwanaland.

ve are ordinarily able to study, take place on the continental  
and in the epicontinental seas, so that although the

continental masses of to-day show little, if any, traces of the original crust of the earth, they can still be regarded as masses of comparatively light rock buoyed up on the heavier basaltic layer, as shown in Fig. 7. Given this fundamental conception of the continents, there is nothing inherently impossible in the idea that the continental masses can split and the fragments drift apart. This is, broadly, Wegener's famous theory of Continental Drift. Applying these theories to Asia, the old stable blocks of the south, Arabia and India, were originally part of one great continental block (Gondwanaland), which included also the western half of Australia, nearly the whole of Africa and the eastern half of South America. Gondwanaland split up and the fragments drifted apart. Similarly, if one accepts Argand's interpretation of the northern parts of Asia,

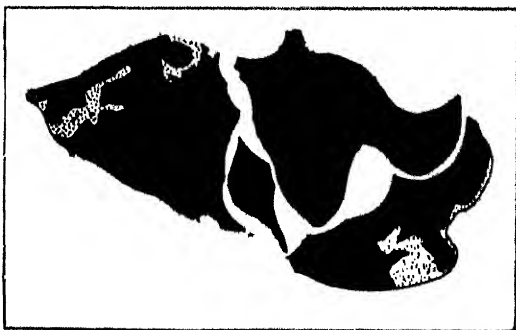


FIG. 9.—The old massifs of the north of Asia before disruption and dispersal according to the theory of continental drift. The present position of these blocks is shown in Fig. 8.

(After Argand.)

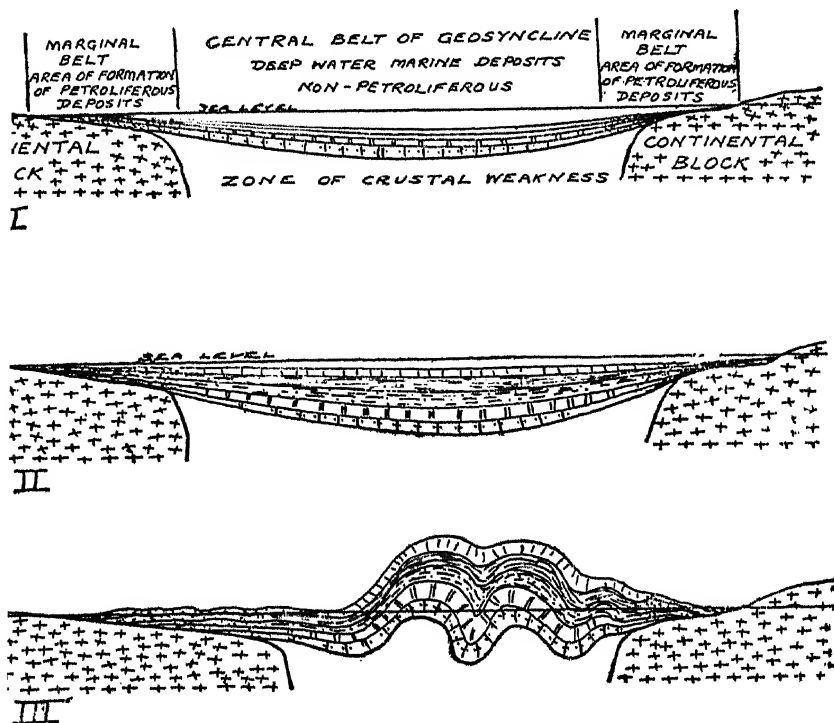
one can imagine the four old platforms there originally part of one mass. Fig. 9 shows them reunited as they may originally have been. They drifted apart gradually: the intervening areas became seas in which huge quantities of sediment were deposited and then rucked up into folds by successive earth movements, finally forming a solid mass.

Actually, it may be noticed, Wegener's theory of Continental Drift is unnecessary to explain the structure of Northern Asia: the four ancient platforms may still represent portions of an ancient North Asian continent, the areas between them having been worn out by the ordinary processes of denudation and filled with masses of sediment.

**An Orthodox Conception of the Structure of Asia.** In attempting to outline a rather different conception of the structure of the continent it has been labelled 'orthodox' for

of a better title, since the hypotheses of Wegener and I may still be regarded, perhaps, as 'unorthodox'. In any case we have the fundamental threefold division of the continent into Central and Northern Asia, the Alpine fold-belt and the old blocks of the south. Northern Asia includes the two main units:

- (a) Angaraland or the plateau of Central Siberia.
- (b) The West Siberian lowland.



—Diagrams showing the gradual infilling (I and II) of a geosynclinal trough and its deformation (III) into an anticlinorial mountain chain.

to the south of these lies a great series of basins, of varying origin, separated by mountain ranges of varied origin. It is of course well known that there are certain parts of the earth's crust which are relatively stable—the stable blocks or ancient shields to which we have already referred—other parts where the crust is relieved by fracture or 'faulting'; other parts where the crust is relieved by crumbling or folding. In Northern and Central Asia Angaraland is an ancient stable block; West Siberia is probably a sunken stable block, that is, one whose

surface is relatively low; most of the basins of Central Asia consist of slightly sunken blocks which have not been subjected to folding since early Mesozoic times, and which are separated by mountain ranges of two types. The mountains are either

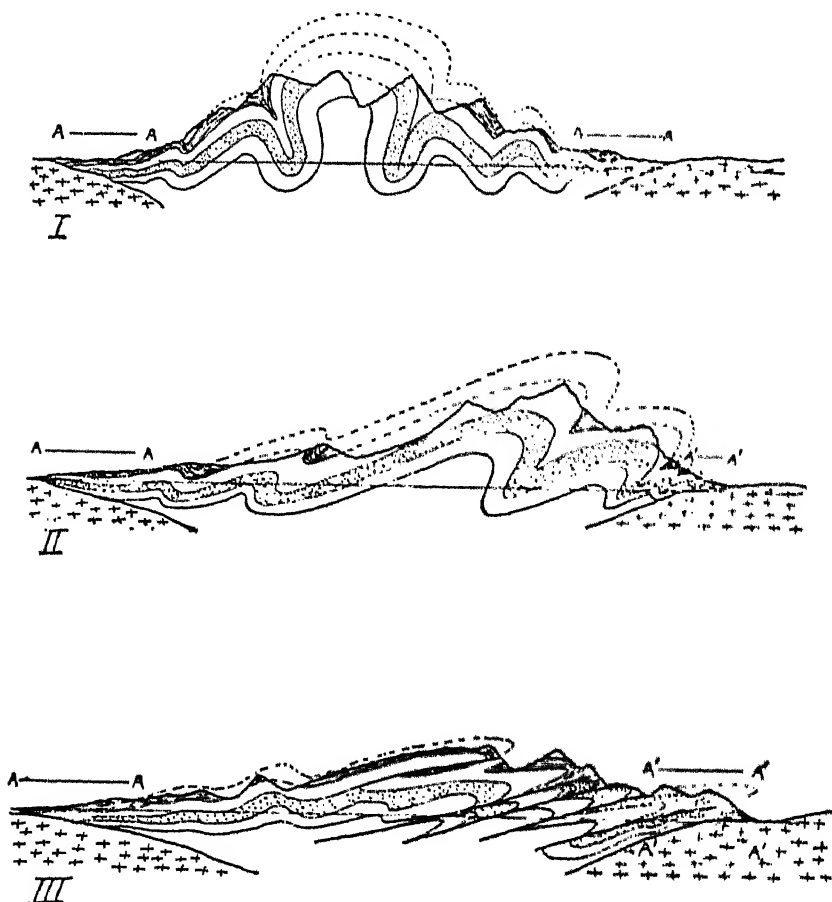
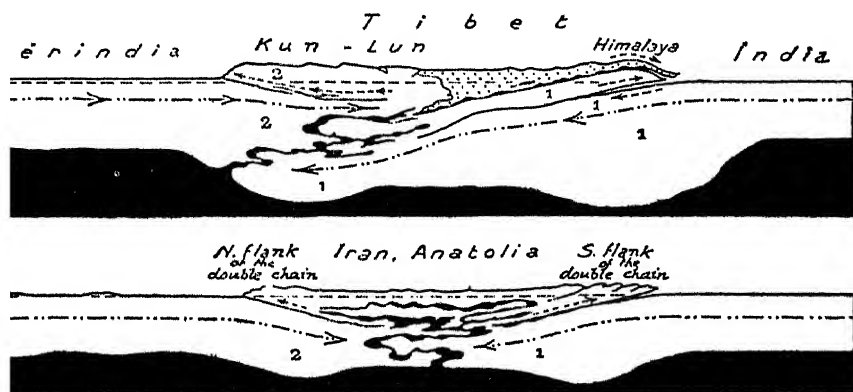


FIG. 11.—Sections through fold mountain chains, showing three types of structure to be studied in the fold mountains of Asia.

I. Symmetrical anticlinorium, probably rare; II. Asymmetrical anticlinorium; III. Overthrust anticlinorium of the type exemplified in the Himalayas.

folded belts or are block mountains left as ridges because of the downfaulting around them. It will be necessary to refer again to this question in the section on Mongolia. Of one thing there is little doubt: Central Asia has been a continent since Mesozoic times.

ning now to the question of the Alpine fold belts, towards se of the Mesozoic one can picture a long narrow sea or separating the continent of Central Asia from the con- l masses of Gondwanaland—a long narrow sea of the f the Mediterranean but much larger and known in cal literature as a geosynclinal basin. To this particular e name Tethys has been given. In this sea were deposited hicknesses of sediment. At the same time epicontinental d great gulfs fringed the south and east of Asia. Then, tantly during the Tertiary period, came a great series of novements. The seas lying between or on the flanks of ntinental masses formed the lines of weakness; their



—The structure of the Tertiary fold mountains of the Central Asiatic belt, according to Argand.

It is noted that the overthrusts seen in the Himalayas are attributed to 'under-riding' by the blocks and that complementary to the southern flank of each chain (overthrust southwards) northern flank overthrust northwards.

As the rocks were folded and overfolded into the greatest chains of the Asiatic continent. Fig. 10 is an attempt to illustrate the process of deformation of the great geosyncline, Fig. 11 illustrates the rock structures actually found in the Himalayan region and shows the overfolding of the rocks. Fig. 13 shows the position of the Alpine folded belts in Asia.<sup>1</sup> It will be noted later that the individual ranges are not necessarily parallel to the edge of the folded belts, but tend to be arranged *en echelon* along those belts.

The writer has attempted to show elsewhere (*Journ. Inst. Petr. Techn.*, V, 1928, pp. 28-53) that the oilfields of Asia are associated with the margins of these Alpine fold belts, hence their indication on

## REFERENCES

In addition to the works quoted above, the mine of information is Suess' great work, *Das Antlitz der Erde*. The French edition of this work is the best, because of the full documentation. See also Hobbs' *Earth Features and their Meaning* (New York: Macmillan, 1920);

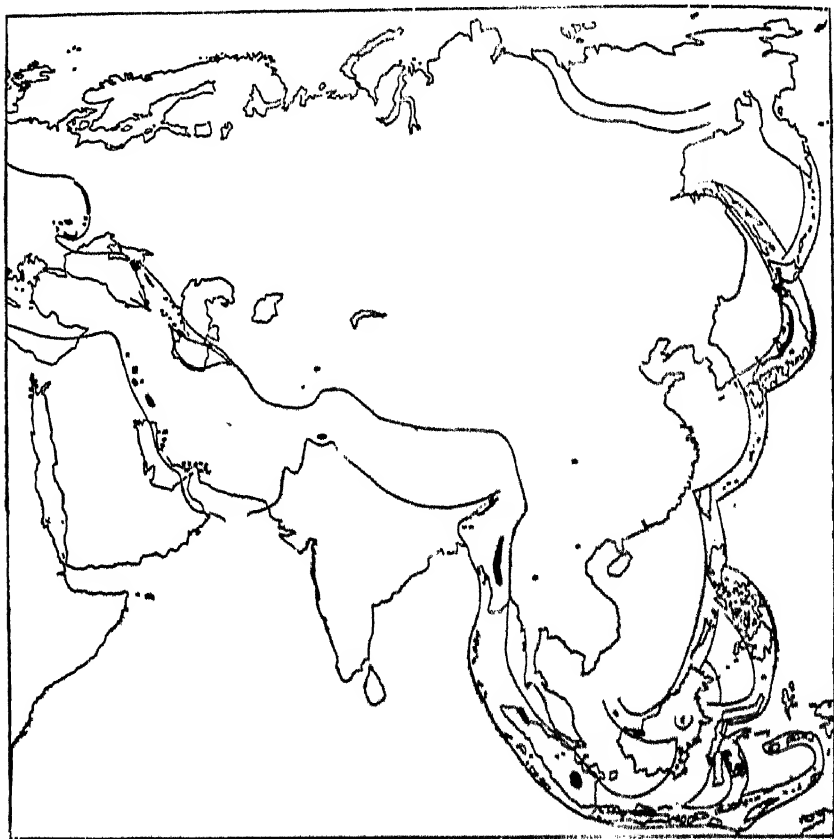


FIG. 13.—The Tertiary folded belts of Asia, shown within the fine lines.

L. de Launay, *La Géologie et les Richesses minérales de l'Asie* (with structural maps of Asia) (Paris: Béranger, 1911); W. A. Obrutschew, *Geologie von Sibirien* (Berlin: Borntraeger, 1926); Grabau, *Stratigraphy of China* (Peking: 1925-1926); C. P. Berley and F. K. Morris, Publications of the Asiatic Expeditions of the American Museum of Natural History, No. 29, 30 and 31. An important work recently published is *The Structure of Asia*, edited by J. W. Gregory (London: Methuen, 1929). In particular, the introductory chapter of this work should be consulted.

## CHAPTER III

### THE CLIMATES OF ASIA

HERE are two features of Asia which exercise a controlling influence in determining the climates: the one is its size; the other is the great central core of plateaus and its buttresses of great mountain ranges.

From a meteorological point of view Eurasia—and indeed North Africa as well—must be considered as a single land mass having a total area which approaches 10,000 square miles. The heart of Asia is more than 1,500 miles from the nearest seaboard,<sup>1</sup> a circumstance which is alone sufficient to ensure conditions of extreme continentality, and in any case, is to be expected to result in a great difference in summer and winter conditions.

The orographical structure of Asia is such as to accentuate climatic features due to the vast size of the land mass. Central plateaus are flanked by ranges which effectively prevent the penetration of oceanic influences to the interior; the succession of plateaus and ranges stretching without break from Asia Minor to the extreme north-east of the continent forms a practically impassable wall in the lower part of the atmosphere. As a result the winters are exceedingly cold in the plains lying to the north of this central mass, the 'cold pole' of the earth being situated, as shown in Fig. 14, in the north-east of Siberia on the Arctic Circle. Especially, the plains of India are completely shut off from oceanic influences, and in summer some of the highest recorded temperatures on the surface of the earth are found in North India.

It is impossible, therefore, to divorce the meteorology of Asia from its structural features. Sea-level isotherm maps and maps, in particular for the summer months, are apt to give very erroneous impressions, and special attention should be given to temperatures and pressures not reduced to sea-level. **Conditions in Winter.** In the winter months of the Northern Hemisphere, when the earth's thermal equator shifts to the

<sup>1</sup> Contrast North America, just over 1,000 miles.

south of the Equator, the centre and north of Asia become extremely cold. The northern plains are far removed from the oceanic influences—notably the influence of the warm North Atlantic Drift—which modify so profoundly the winter rigours of Western Europe and at the same time are completely cut off by mountain barriers from any warming influence of the Indian or Pacific Oceans, yet open to cold influences from the frozen Arctic. The higher layers of the atmosphere, over the

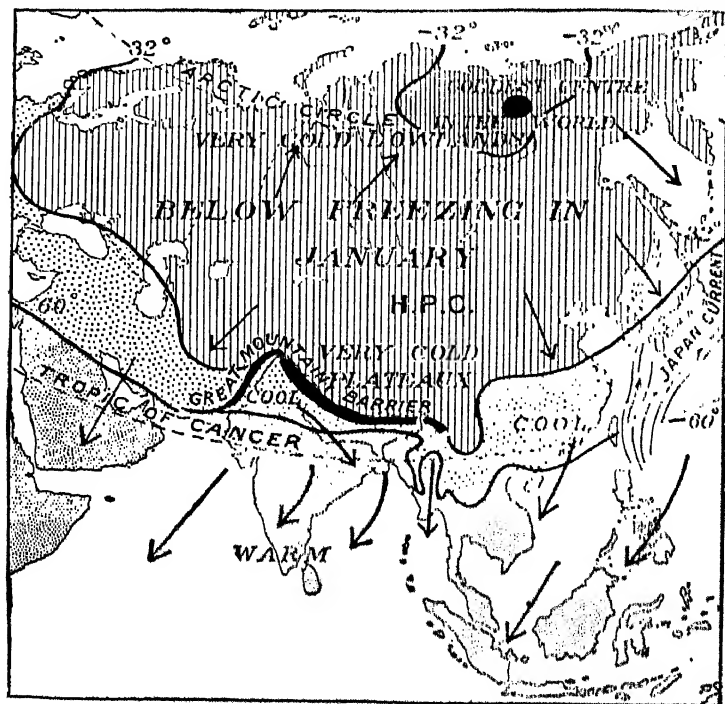


FIG. 14.—Winter climatic conditions in Asia.

The temperatures shown are the approximate average temperatures in January (not reduced to sea-level), and stress the cold heart of the continent more than do sea-level isotherms. H.P.C. = the high, pressure centre (very approximate).

great ranges of mountains and tremendous lofty plateaus of Central Asia, are naturally cold. Hence in winter the whole of Central and Northern Asia is occupied by a great cushion of cold, heavy air forming naturally a region of high pressure.

We may express the matter in another way by saying that the 'low temperature of Asia in winter intensifies the sub-tropical high pressures, and causes them to extend far north over the continent, and form a great cushion of heavy air,



over the Gobi Desert'.<sup>1</sup> The Arctic low-pressure belt, exists over the North Atlantic (as the semi-permanent ion off Iceland) and over the North Pacific, is completely uted over the Asiatic continent.

viously the heavy air over the heart of Asia in winter w out in all directions, giving rise to cold, dry winds ; outwards from Central Asia. Where the barometric t is high and the progress of the winds comparatively ded by mountain ranges, the winter winds are not only cold but strong and continuous. Such is the case over n China. On the south, however, the mountain barrier d by the Himalayas is sufficiently high to stop their sentirely. They fail completely to reach India. The last e might well have been put in italics, for the Central igh pressures are frequently credited with being the cause ia's north-east monsoon. Actually the comparatively northerly winds experienced in India in winter, as will cribed later, originate from subsidiary high-pressure over the northern plains of India itself.

he winter months practically the whole of Europe lies in sterly wind belt and is under the influence of the suc- of cyclones which roll eastwards across the Atlantic. ther passage of these cyclones is effectively prevented by h-pressure centre of Asia : one current of the westerlies is d to the north and results in a winter snowfall in North- . Siberia ; a second current is deflected to the south etrates as far eastward as Baluchistan and the Punjab.

outward blowing winds of winter will obviously be dry it is only after they have crossed some stretch of water ey are able to pick up moisture and become rain-bearing. be noticed in the sequel, they bring rain to Japan, Central uth China, the coast of Indo-China, the Philippines and

Elsewhere, as shown in Fig. 15, Asia is practically in the winter half of the year, except for the East Indies ie in the Equatorial belt. It may indeed be said that general rainlessness of Asia in winter there are five ons :

The snowfall of North-western Siberia (not sufficiently heavy to be shown on Fig. 15) brought by cyclones of the westerly wind belt.

The rainfall of Asia Minor, South-western Asia, Persia, Baluchistan, Afghanistan and North-western India brought by the southern stream of cyclones of the westerly wind belt.

- (c) The rainfall of Ceylon brought by the 'north-east monsoon' which has crossed the Bay of Bengal.
- (d) The rainfall of the East Indies, lying in the Equatorial belt.
- (e) The rainfall of certain east-coast tracts due to oceanic influences affecting the normal character of the winter winds.

**Conditions in Summer.** As the summer months approach, the land heats rapidly, and not only is the great high-pressure

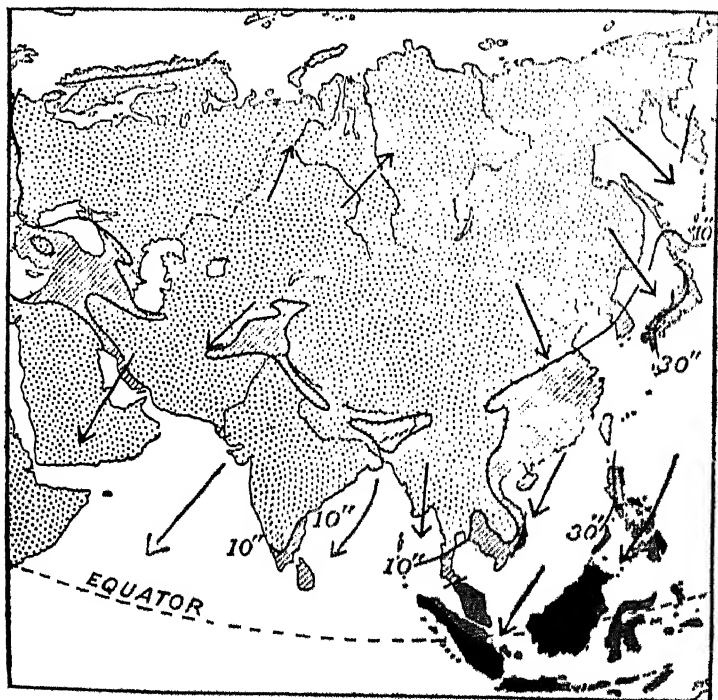


FIG. 15.—Winter rainfall and winds in Asia.

The isohyets shown are 10, 30 and 60 inches for the half-year November 1st to April 30th.

system of winter completely dissipated, but it is actually replaced by a succession of low-pressure areas. Again, the influence of the mountain barriers is paramount. A sea-level isobar map shows a low-pressure area stretching from Arabia over Baluchistan, North-western India and Tibet. Actually there is no connection between the intense low-pressure centre which develops over the plains of North-western India and those which develop over the plateaus of the continental interior. The heating of the

and the change from high pressures to low take place and progressively. The outblowing winds become feebler; April and May are months marked in many areas by the irregular breezes. It might be expected that these breezes would gradually strengthen into the summer monsoon. Such, however, is not the case. The equilibrium is suddenly, and the monsoon 'bursts', blowing suddenly with full violence. This is particularly the case in India,

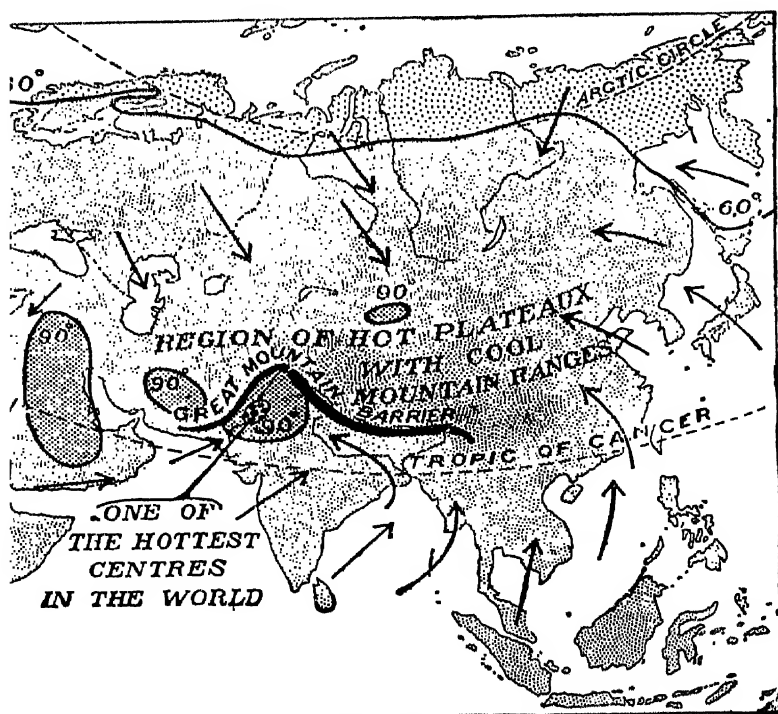


FIG. 16.—Summer climatic conditions in Asia.

temperatures shown are the approximate average temperatures in July (not reduced to sea-level) the generally high temperature of the whole continent, despite the elevation of the interior, also emphasizes the independence of the Indian monsoon.

attempt at explanation will be offered later. The winds flow in towards the low-pressure centres vary greatly in strength and regularity. They are strong and constant in India where the low-pressure centre over the north-western part is well marked. They are much feebler over China and elsewhere where the low-pressure centres of the interior lie over the plateaus and are less insistent in their attraction for the dry air. Thus in India it is the winter monsoon which

is light, the summer monsoon strong; in China the winter monsoon is strong and the summer monsoon comparatively feeble.

But in all cases the inflowing winds are from the ocean; they are moisture-laden, and the summer months are the rainy months over practically the whole of Asia. The amount of rainfall is determined by orography: the mountain ramparts of the central plateaus effectively prevent a heavy fall anywhere in the

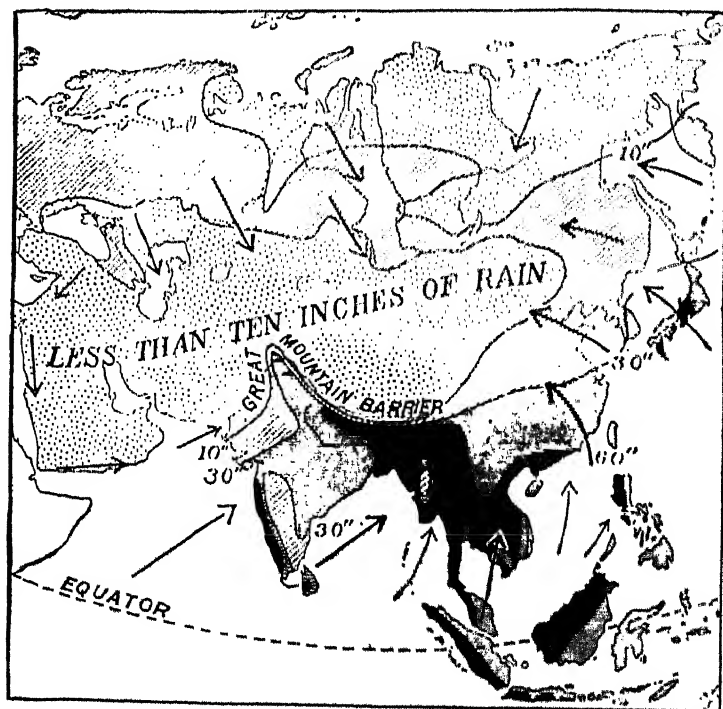


FIG. 17.—Summer rainfall and winds in Asia.

The isohyets shown are 10, 30 and 60 inches for the half-year May 1st to October 31st. All parts shown in black have more than 60 inches in this period.

heart of Asia. Only in one part of Asia is the summer normally rainless: South-western Asia (excluding Southern Arabia) as far east as Baluchistan and Afghanistan forms a continuation of the Mediterranean region of Europe and North Africa just as it does in winter.

In the above remarks we have used the word 'monsoon' in the way in which it is usually used amongst climatologists as meaning the periodic *winds* of Asia. Actually the word

mean season and is often used, especially by residents a, as equivalent to the rains or the rainy season.

**Climates of Asia.** The three essential elements in mates of Asia are the dry outblowing winds of winter, inblowing winds of summer and the controlling influence topography. Owing to the vast extent of the continent, er of climatic types may be distinguished.

*The Equatorial Climate*, as its name implies, occurs as on either side of the Equator, normally extending roughly n  $5^{\circ}$  North and  $5^{\circ}$  South. It therefore occurs almost out the East Indies, in Malaya and, in a modified degree, lon.

temperature is high all the year round, and is charac- by its very small variation. In typical localities the e for the year is between  $78^{\circ}$  and  $80^{\circ}$  F.; the range n the hottest and coldest months is normally less than milarly, the differences between day and night tempera- re small, and may be taken as usually less than  $20^{\circ}$ . quatorial regions are popularly, but erroneously, regarded hottest in the world. The average temperature, it is s uniformly high, and the constantly damp, steamy here may be enervating, but the Equatorial climate is m being the most trying in the world. The absence of high temperatures—the thermometer rarely rises above .—and the pleasantly cool rains which accompany the on thunderstorms make the climate quite pleasant. particularly the case in maritime situations such as the of Singapore, where land and sea breezes impart a welcome ent to the air. The climate is found at its worst in the r of the great Equatorial forests where the air is abso- still. The effect of elevation is to lower the average ature and, sometimes, to result in a slightly greater

Equatorial regions the rain falls at all seasons of the year ere is, typically, no 'dry season', except in a relative

The Equatorial lands may be considered as lying in lt of Calms or Doldrums, and the rains are mainly, some- entirely, convectional rains. During the early part of ay bright sunshine induces rapid evaporation and an d current in the atmosphere. The ascending moisture- air becomes cooled and clouds form. The formation of in the afternoon and the subsequent precipitation is tly accompanied by thunder. The rain falls in tor- downpours, usually of short duration. This daily pro- e is not evident from the statistics, which show an

'average' of cloud of between 3 and 7 throughout the year. The relative humidity in regions of Equatorial climate is uniformly high, being on an average over 80 per cent. the year through.

Although rain falls throughout the year, stations near the



FIG. 18.—The climatic regions of Asia.

The dotted line shows the limit of permanently frozen ground.

The word 'temperate' is used here and throughout this chapter in the sense of 'in the temperate zone', i.e. in middle latitudes (as opposed to tropical). Many of the 'temperate' climates are actually climates of great extremes.

Equator usually have two periods of maximum rainfall; stations towards the northern or southern fringes of the belt usually one. In most cases the rainfall maximum or maxima occur shortly after the period when the sun is vertical. The further one goes away from the Equator the longer will be the duration

dry or relatively dry period; hence the gradual passage to Tropical Monsoon climate.

### EQUATORIAL CLIMATE—TEMPERATURES IN ° F.<sup>1</sup>

	Latitude.	Ht. ab'v's Sea.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Average.	Range.
		ft.														
	1° N.	10	78	79	80	81	81.5	81	81	81	80	80	79	79	80	3.2
(as)	4° S.	40	81	81	81	79	79	78	77	78	78	79	80	81	79	3.6
	6° S.	23	78	78	79	79	80	79	78	79	79	80	79	78	79	2.0
	5° N.	23	80	80	81	82	81	81	80	80	80	80	79	79	80	2.9
)	5° N.	98	79	79	81	82	82	81	81	81	81	81	80	79	80	2.9

### EQUATORIAL CLIMATE—RAINFALL IN INCHES.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
	8.5	6.1	6.5	6.9	7.2	6.7	6.8	8.5	7.1	8.2	10.0	10.4	92.9
	5.6	4.5	5.4	10.9	20.5	23.9	23.2	16.0	9.1	6.9	4.1	5.7	135.8
	13.0	13.6	7.8	4.8	3.7	3.6	2.6	1.3	2.6	4.1	5.0	8.7	70.8
	3.9	3.0	4.7	7.0	11.0	7.2	8.9	12.8	19.0	16.1	10.9	4.8	109.3
	19.4	9.9	7.8	4.1	5.1	8.6	10.0	6.9	9.5	10.2	16.4	19.3	127.2

The Tropical Monsoon Climate occurs mainly within the . The typical monsoon lands are India, Indo-China, Southern China. Central and Northern China and Japan are called ' Monsoon lands ' ; their rainfall is due to similar winds, but they lie outside the Tropics, and have distinctly different centers, thus necessitating their separation from the tropical monsoon lands. In winter the monsoon lands are under the influence of the normal Trade winds—the ' winter monsoon ' ; hence these winds, as we have already seen, are completely different. It is customary to distinguish three seasons in tropical monsoon lands, though details will be found later under India where scientific division into four seasons. The three seasons

The cool season, with little rain, from November to about the end of February.

The hot season, also rainless, from February to the middle of June.

The rainy season, when the rain cools the atmosphere and temperature is generally lower, from the middle of June to about the end of October.

Figures quoted from Kendrew, *Climates of the Continents*. The figures given for the range of temperature are calculated from more data than are given in the monthly columns.

Generally speaking, the drier the place the less the cooling influence of the rain is felt and the greater the range of temperature. There is thus a very large range in the Punjab (plains of North-west India). The wetter places, on the other hand, and those under the influence of the sea, have a much smaller range of temperature. Bombay is a good example. It should be noted that in October, when the rains are drying up, there is a slight rise in temperature.

The rainfall in monsoon lands depends largely on relief. Where the monsoon comes in contact with high mountains near the coast, and is forced to rise, the resulting rainfall is very great. Average annual falls of over 500 inches are known, and such exposed situations may be classed as the rainiest in the world. On the other hand, near the low-pressure centre in India, towards which the winds blow for great distances overland, they arrive practically dry, and certain stations have less than 5 inches of rain per year. Other details of the monsoon climate will be found later under India. In studying the following figures, notice the special position of Hué.

### TROPICAL MONSOON CLIMATE--TEMPERATURES IN ° F.

Station.	Latitude.	Alt. ab'v. Sea.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.	Range.
		ft.														
Bombay .	18°54'	37	74	75	78	82	85	82	79	79	79	81	79	79	79	10·1
Rangoon .	16°46'	18	75	77	81	85	82	80	79	79	79	80	78	79	79	10·3
Mandalay .	21°59'	250	69	74	82	89	88	85	85	85	83	82	76	69	81	20·4
Delhi .	28°39'	718	58	62	74	86	92	86	85	84	78	68	60	77	34·3	
Karachi .	24°51'	13	65	68	75	81	85	87	84	82	82	80	74	67	78	21·5
Hong-Kong	22°16'	108	60	58	63	70	77	81	82	81	80	76	69	63	72	24·0
Huê .	16°26'	23	69	67	74	80	83	85	84	85	81	78	73	70	78	17·6

### TROPICAL MONSOON CLIMATE--RAINFALL IN INCHES.

Station.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Bombay .	0·1	0	0	0·1	0·5	20·6	24·6	14·9	10·9	1·8	0·5	0·1	74·1
Rangoon .	0·1	0·2	0·2	1·7	11·7	18·3	21·4	19·6	15·9	7·1	2·5	0·1	98·8
Mandalay .	0·1	0·1	0·2	1·2	5·2	5·7	3·3	4·1	6·2	4·5	1·7	0·3	32·0
Delhi .	1·0	0·6	0·7	0·3	0·7	3·2	8·4	7·4	4·4	0·4	0·1	0·4	27·6
Karachi .	0·6	0·3	0·1	0·1	0	0·4	3·2	1·8	0·7	0	0·2	0·2	7·6
Hong-Kong	1·0	1·3	3·3	5·4	12·4	16·8	15·9	14·8	12·5	5·2	1·1	1·0	90·2
Hué .	4·0	4·8	1·8	2·4	3·6	2·8	3·4	4·0	16·2	26·8	22·4	10·2	101·9

### (3) *The China Type of Climate*,<sup>1</sup> or the Warm Temperate

<sup>1</sup> The types of climate here called 'China Type' and 'Manchurian Type' may, perhaps, be better considered together as the 'East Asian' or 'Temperate Monsoon' climate. The rainfall is monsoonal and hence



st Climate, is found in Central and Northern China. and Northern China form part of the great monsoon Asia, but the climate differs from the Tropical Monsoon of India and Southern China in the coldness of the The rainfall, like that of India, is due to the develop- low-pressure centres in the interior of Asia in summer, which rain-bearing winds from the ocean blow. Whilst protected in winter from the cold outblowing winds heart of Asia by the mountain barrier of the Himalayas, not so fortunate. The January isotherm of  $32^{\circ}$  almost the Tropic of Cancer; snow is common in winter, even rains. The essentially summer rainfall is greatest near but as will be explained later under 'China' winter is not completely absent. Three sub-types may be had:

entral China (examples Shanghai and Hankow).

orthern China (example Peking).

apan type, modified by Japan's insular position. The varied climates of Japan will be considered later.

#### CHINA TYPE OF CLIMATE—TEMPERATURES IN $^{\circ}$ F.

Latitude.	Ht. above Sea.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.	Range.
	ft.														
$31^{\circ}13'$	33	38	39	46	56	65	73	80	80	73	63	52	42	59	42.8
$30^{\circ}35'$	118	39	40	49	61	71	78	83.5	83	76	65	54	43	62	44.7
$30^{\circ}55'$	131	23	29	41	57	68	76	79	76	68	55	38	27	53	55.3
$35^{\circ}40'$	69	37	38	44	54	61	69	75	78	72	61	50	41	57	40.5

#### CHINA TYPE OF CLIMATE—RAINFALL IN INCHES.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
.	2.2	2.3	3.4	3.8	3.7	6.5	5.5	5.9	4.7	3.2	1.7	1.2	44.1
.	2.1	1.1	2.8	4.8	5.0	7.0	8.6	4.6	2.2	3.9	1.1	0.6	43.8
.	0.7	0.2	0.2	0.6	1.4	3.0	9.4	6.3	2.6	0.6	0.3	0.1	24.8
.	2.0	2.6	4.3	5.3	5.9	6.8	5.6	4.6	7.5	7.2	4.3	2.3	57.9

he *Manchurian Type of Climate*, or Cold Temperate st Climate, may be assimilated with the climate which around the mouth of the St. Lawrence in North America herefore, called the St. Lawrence or Laurentian type. ate is found in Manchuria and Amuria, and one might,

rom that on the east coast of North America; its seasonal dis- n Manchuria is very different from what it is in the St. Lawrence

indeed, include the North China region mentioned above. The range of temperature is very large, the winters long and severe. The monsoonal influence is still seen in the rainfall régime.

### THE MANCHURIAN TYPE OF CLIMATE—TEMPERATURES IN ° F.

Station.	Latitude.	Ht. above Sea.	Jan.	Feb.	Mar.	Apr.	May	June	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.	Range.
Harbin . .	45°45'	325 ft.	-2	5	24	42	56	66	72	69	58	40	21	3	38	73-8
Vladivostok	43°10'	50	5	12	26	39	49	57	66	69	61	40	30	14	40	64-6

### THE MANCHURIAN TYPE OF CLIMATE—RAINFALL IN INCHES.

Station.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Moukden .	0.2	0.2	0.6	1.0	2.4	3.2	6.7	4.3	2.6	1.7	0.5	0.2	23.6
Vladivostok	0.1	0.2	0.3	1.2	1.3	1.5	2.2	3.5	2.4	1.6	0.5	0.2	15.0

(5) *The Hot Desert Climate* is found over wide areas in South-western Asia about the latitude of the Tropic of Cancer. These regions lie along the sub-tropical high-pressure belts, and are so situated that they are practically outside the influence of either the monsoon or the Mediterranean belts. We say 'practically' because actually it is possible to resolve the hot deserts of South-western Asia into two types—those which have a very dry type of monsoon climate (Lower Indus Valley and the Thar Desert of India) and those which have a very dry type of Mediterranean climate (Syria, Mesopotamia and Persia).

The absence of clouds allows the sun's rays to shine down with unmitigated force on the unprotected soil during the day,

### THE HOT DESERT TYPE OF CLIMATE—TEMPERATURES IN ° F.

Station.	Latitude.	Ht. above Sea.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.	Range.
Jacobabad	28°17'	186 ft.	57	62	74	85	94	98	95	92	89	79	67	59	79	40.4
Aden . .	12°46'	94	76	77	78	81	86	89	88	86	87	82	79	77	82	12.9
Baghdad .	33°21'	220	49	53	59	68	79	87	92	92.5	86	76	61	52	71	43.7

### THE HOT DESERT TYPE OF CLIMATE—RAINFALL IN INCHES.

Station.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Jacobabad .	0.3	0.3	0.2	0.2	0.2	0.1	1.2	1.2	0.2	0	0.1	0.2	4.2
Aden . .	0.3	0.2	0.7	0.3	0.2	0	0	0.1	0.2	0	0.1	0.1	2.2
Baghdad .	1.3	2.1	1.6	0.9	0.2	0	0	0.1	0	0	1.0	1.8	9.0

the absence of cloud at night permits rapid radiation of heat so that the nights are often very cold. Similarly there is contrast between the hot season, when the sun is almost overhead, and the cold season. There is little or no exercise of a cooling influence on the summer temperature. Most of the hot deserts are low lying, so that there is no altitude to temper the heat. As a result some of the temperatures of the world are recorded in these regions. Indeed, in the driest part of the Indus valley of India (a monsoon type), has an *average* temperature of nearly 100° F.

The *Temperate or Mid-Latitude Desert Climate* is the type of the high plateaus of Asia. The Temperate Deserts are far from the oceans by distance and mountain barriers. They differ in having wide ranges of temperature and a very small rainfall. Generally they are huge areas of high pressure masses of cold air—in winter, and areas of low pressure with prevailing winds in summer. The scanty rainfall is mainly in summer, except in those regions such as those which border the Mediterranean countries. Indeed, it is observed that the climate of the temperate deserts is closely related to the climates of the surrounding regions. The temperate deserts of the heart of Asia are bordered on the east by Mediterranean lands, on the south and south-east by monsoon lands, on the east by regions with the China and Japanese types of climate, on the north by the cold temperate lands, on the west by the temperate grasslands. They may thus be a very dry grassland region, a very dry steppe region, and so on.

At least four sub-types may be distinguished:

The Tibet type—found on the highest plateaus (Leh in Kashmir is the nearest record available).

The Iran type—found on the enclosed plateaus of Persia and Afghanistan, with a winter rainfall régime (example, Tehran in Persia).

The Gobi type, found on the plateaus of lower elevation and in the basins north of Tibet (examples, Kamgar, Urga in the Gobi Desert, Lukchun in the Tarim Basin).

The Turkistan or Turan type, found on the lowlands to the south-west of Siberia, the Turanian Basin—a very dry type of steppe (example, Petro-Alexandrovsk).

The rarity of the atmosphere may result in some extraordinary phenomena of temperature. In Tibet the ground temperature in the sun may be over 130° whilst it is still freezing.

in the shade. There are similarly enormous differences between day and night temperatures. Some of the greatest known annual ranges are in the climates of the temperate deserts. The rainfall varies from 15 inches downwards. Semi-desert conditions may even prevail where the rainfall is rather more. In the higher regions some of the precipitation is in the form of snow.

### THE TEMPERATE DESERT TYPE OF CLIMATE—TEMPERATURES IN ° F.

Station.	Latitude.	Altitude.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.	Range.
		ft.														
Leh . .	34° 10'	11,503	17	19	31	43	50	58	63	61	54	43	32	22	41	45·3
Tehran .	35° 42'	4,002	34	42	48	61	71	80	85	83	77	66	51	42	62	51·3
Kashgar	39° 30'	4,255	22	34	46	61	70	77	80	76	60	55	40	26	55	57·9
Lukchun	42° 40'	— 50	13	27	45	66	75	85	90·5	85	74	55	33	21	56	77·3
Urga .	47° 58'	3,800	15	4	13	34	47	50	63·5	50	47	20	8	—7	28	78·7
Petro-Alexandrovsk	41° 20'	295	23	29	43	58	72	80	83	79	67	52	38	30	54	60·5

### THE TEMPERATE DESERT TYPE OF CLIMATE—RAINFALL IN INCHES.

Station.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Leh . . .	0·3	0·4	0·2	0·2	0·3	0·2	0·5	0·5	0·2	0·2	0	0·2	3·2
Tehran . .	1·2	0·9	2·4	0·9	0·4	0	0·4	0	0·1	0·1	1·2	1·3	8·9
Kashgar .	0·3	0	0·2	0·2	0·8	0·4	0·3	0·7	0·3	0	0	0·2	3·4
Petro-Alexandrovsk	0·2	0·4	0·5	0·6	0·2	0	0	0·1	0	0·1	0·1	0·1	2·1

(7) *The Mediterranean Climate* is, like the monsoon climate, a very distinctive type. It is found in Asia round the coasts of Asia Minor and Syria and in a modified form along the Kurdistan Mountains. The Mediterranean climate is a 'west coast' climate, occurring on the western sides of the land masses in roughly the same latitudes as the China type on the east. On the west the great land masses roughly between latitudes 30° and 45° are under the influence of the sub-tropical high-pressure belt in summer when the regions are hot and dry, with outblowing winds. In winter, however, the regions come under the influence of the Westerly wind belt and so enjoy moist, mild winters. In other words this is, *par excellence*, the 'Winter Rain Climate'. Another characteristic of the Mediterranean climate is the large amount of sunshine. Almost cloudless skies are the rule in summer, and even in winter clouds are less numerous than would be expected.

The Mediterranean lands of South-western Asia belong to

called the 'Eastern Mediterranean type', and suffer colder winters than are usual further west.

### MEDITERRANEAN CLIMATE—TEMPERATURES IN ° F.

Latitude.	Altitude.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.	Range.
38° 25'	ft. 33	46	48	51	59	69	76	81	82	75	66	58	52	63·7	36
33° 54'	115	54	57	60	66	70	76	80	82	80	75	64	58	68·5	28

### MEDITERRANEAN CLIMATE—RAINFALL IN INCHES.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
.	2·8	2·6	3·2	1·1	0·9	0·4	—	0·4	0·5	0·8	3·4	3·8	19·9
.	6·1	3·5	2·1	1·0	0·3	—	—	—	0·0	0·6	4·4	7·0	25·0

es from *The Climate of the Eastern Mediterranean*, H.M.S.O.)

The *Temperate Continental*, or mid-latitude grassland is found in the wide open grasslands or steppelands of northern Siberia and, in a rather modified form, in such areas as the grasslands of Mongolia. This type of climate is characteristic of the interiors of the great land masses, removed from the influence of the sea and hence suffering considerable extremes of temperature. The light spring and summer rains encourage the growth of grass, but are insufficient for trees. The winters are cold and severe; the summers short but warm. The rainfall in typical regions ranges between 10 and 30 inches, coming mainly entirely in spring and summer. The great heat of late summer and the intense cold of winter are alike immaterial to the growth of grass: it seeds and withers. The winter precipitation where present is in the form of snow, and it should be noted that the snow covering keeps the ground warm in winter, whilst the melting of the winter snows in spring enhances the supply of moisture for the germinating grass.

### TEMPERATE CONTINENTAL CLIMATE—TEMPERATURES IN ° F.

	Latitude.	Altitude.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.	Range.
.	53° 20'	ft. 480	—2	1	13	33	51	62	67	62	50	35	16	4	33	69·3

### TEMPERATE CONTINENTAL CLIMATE—RAINFALL IN INCHES.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
.	0·3	0·2	0·3	0·4	1·0	1·4	1·8	1·6	0·9	0·9	0·7	0·6	10·1

(9) *The Cold Temperate Climate*, or climate of the northern coniferous forests, is found over a broad belt across the northern lowlands of Asia. The average temperature is low, and the greater part of the somewhat scanty precipitation is in the form of snow. The natural vegetation is everywhere of the evergreen coniferous forest type; the warmth of the summer sun is normally insufficient for the ripening of cereals. A feature of very great significance is the enormous difference between the length of the very short winter days and the very long summer days. In the heart of Northern Asia there are tracts with a range of over  $100^{\circ}$  in the year—the greatest in the world. Nearly all stations have an average temperature for the year below  $40^{\circ}$  and over very large areas the average is below freezing. There is usually a short but surprisingly warm summer, with the average for the hottest month sometimes approaching  $70^{\circ}$ . Three months with a temperature of over  $60^{\circ}$  are needed for the ripening of wheat; in this climatic belt only the extreme southern margins are sufficiently warm, though the long summer days permit the hardier grains to ripen with great rapidity rather farther north. Owing to the small evaporation and the fact that much of the precipitation is in the form of snow, which lies on the ground in winter so that when the warmth of spring comes it melts and soaks gently into the ground and little is lost, a rainfall as low as 10 inches is adequate for tree growth. Most areas show a marked summer maximum in precipitation.

#### COLD TEMPERATE CLIMATE—TEMPERATURES IN $^{\circ}$ F.

Station.	Latitude.	Altitude. ft.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.	Range.
Berezov .	$63^{\circ} 50'$	100	-11	-2	11	21	35	51	61	56	42	25	4	-7	24	72.0
Verkhoyansk .	$67^{\circ} 50'$	330	-59	-47	-24	7	35	55	60	50	36	5	-34	-53	3	118.6

#### COLD TEMPERATE CLIMATE—RAINFALL IN INCHES.

Station.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Berezov .	1.0	0.6	0.8	1.3	1.6	2.2	3.4	2.3	2.3	1.1	1.3	0.5	18.4
Verkhoyansk	0.2	0.1	0	0.1	0.2	0.5	1.2	0.9	0.2	0.2	0.2	0.2	4.0

(10) *The Arctic Desert*, or tundra climate, is found along the northern shores of Asia. Within the Arctic Circle the winters are very long and very cold—there are at least some days on which the sun never appears—and the summers are very short but hot. Though for certain periods the sun never sets, it

ver rises far above the horizon. Temperature and rainfall comparable with those in the northern parts of the coniferous forests, but summer temperatures are lower. Agriculture is possible, for the ground is frozen for three-quarters of the year.

Before terminating this section it must be noted that no specific reference has been made to 'Alpine' climates. In a very broad way the altitudinal climatic zones resemble latitudinal climatic zones. Reference will be made in the regional section to important local variations consequent upon elevation.

**Köppen's Classification of the Climates of Asia.** The scheme of classification which has been used for the climates of Asia in this book is a scheme based primarily on characteristic 'types', the types showing a close correlation with natural vegetation and with agricultural regions. It may be objected that these climatic types are not capable of exact mathematical definition and that in a scientifically exact and logical classification such a definition should be possible. Such a logical scheme has been drawn up by W. Köppen,<sup>1</sup> who distinguishes, amongst the climates of the world, six main zones, each of which is divided and subdivided into a number of climatic provinces and smaller areas. Each of the main zones is designated by an initial letter (A, B, C, D, E and F); the province by a descriptive letter (W = Wüste or desert (rainfall under 25 cms.); S = Steppe (rainfall 25 to 50 cms., i.e. 10 to 20 inches); special features of the area by small letters.

The six main zones and the eleven climates are as follow :

A. Tropical Rainy Climates.

1. Hot damp primeval forest climate.
2. Periodically dry savana climate.

B. Dry Climates.

3. Steppe climate.
4. Desert climate.

C. Warm Temperate Rainy Climates.

5. Warm climate with dry winters.
6. Warm climate with dry summers.
7. Damp temperate climate.

D. Sub-Arctic Climates.

8. Cold climate with dry winters.
9. Cold climate with wet winters.

E and F. Snow Climates.

10. Tundra climate.
11. Perpetual frost climate.

<sup>1</sup> *Die Klimate der Erde*, Berlin, 1923; also *Petermann's Mitteilungen*, LIV, 1918. See also *Geographical Review*, VIII, 1919, 188-91.

The special features indicated by small letters are:

a = temperature of warmest month more than  $22^{\circ}$  C. ( $72^{\circ}$  F.).  
 b = warmest month less than  $22^{\circ}$  C. but more than four months above  $10^{\circ}$  C. c = one to four months more than  $10^{\circ}$  C. ( $50^{\circ}$  F.); coldest above  $-3.6^{\circ}$  C. ( $27^{\circ}$  F.). d = as c, but coldest month below  $-3.6^{\circ}$  C. f = constantly moist. g = Ganges type with maximum temperature before summer rains. h = hot, with mean

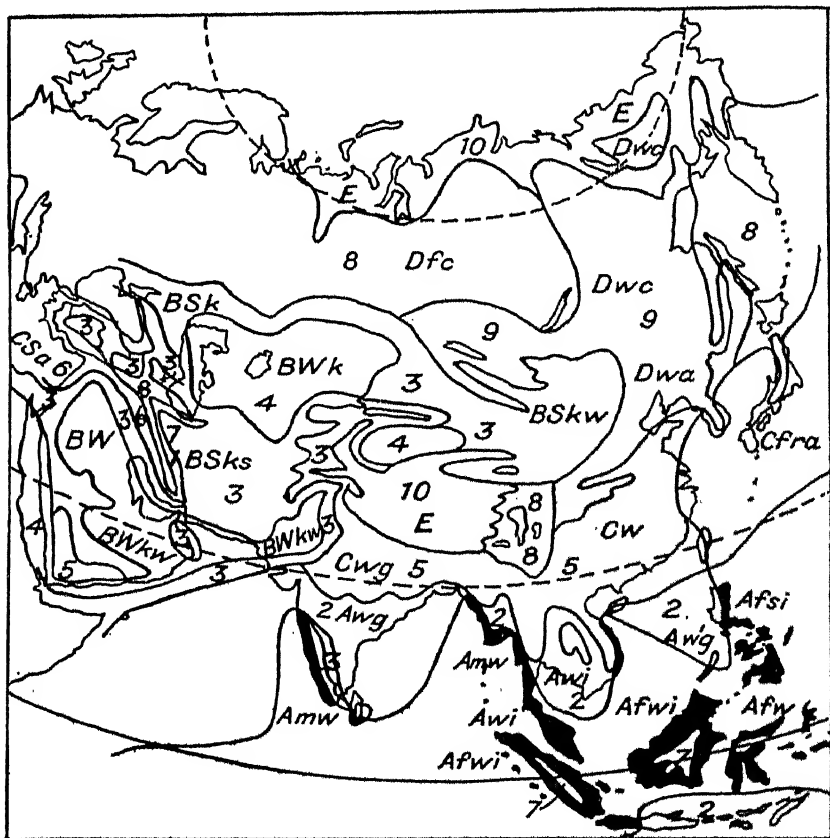


FIG. 18A.—Köppen's climatic divisions of Asia.

annual temperature above  $18^{\circ}$  C. ( $64^{\circ}$  F.). i = isothermal, difference between extreme months less than  $5^{\circ}$  C. k = winter cold, mean annual less than  $18^{\circ}$  C., warmest month above  $18^{\circ}$  C.; k' as k, but warmest month less than  $18^{\circ}$  C. m = monsoon rains, heavy, giving evergreen forest. n = fog; n' = high humidity. p = fog infrequent but high humidity and high temperature. s = dry in summer. w = dry in winter; s' = rainy season in autumn;



' and w'' = rainy season in two parts with short dry season intervening.

Köppen's scheme has been detailed here and a map of Asia given because of the extensive use of his classification. But in the writer's opinion the results in Asia are far from satisfactory and the arbitrary lines separating even the major zones have little meaning. Thus cutting India in half is the line separating A' and 'C' climates. Yet this line does not correspond to any which can be distinguished on the grounds of vegetation, agriculture or any phenomena of human occupancy. Actually it cuts right across a well-marked minor as well as a major natural region of the country. Similarly, Cressey concludes that his classification 'is not particularly suitable for the climates of China and Köppen's map needs considerable revision'.<sup>1</sup>

**Thornthwaite's Classification of the Climates of Asia.** The classification introduced by C. Warren Thornthwaite<sup>2</sup> is like Köppen's in that it is quantitative and attempts to determine the critical limits significant to the distribution of vegetation and also in that it employs a symbolic nomenclature in designating the climatic types. It differs in that it makes use of two new climatic concepts, precipitation effectiveness and temperature efficiency. It is inferred that in the tropical rain forest, the most rapidly growing and the densest vegetation type on the earth, the climate must be the most favourable of all for plant growth . . . precipitation effectiveness and temperature efficiency must be at a maximum'.

Five types based on humidity have been recognized and the precipitation effectiveness' (P-E Index) calculated according to a formula explained in the 1931 paper quoted below. These are:

Humidity Type.	Vegetation.	P-E Index.
A (Wet) . . . .	Rain Forest	128 and above
B (Humid) . . . .	Forest	64 to 127
C (Subhumid) . . . .	Grassland	32 to 63
D (Semiarid). . . .	Steppe	16 to 31
E (Arid) . . . .	Desert	0 to 15

Six 'temperature efficiency types' are distinguished as follows:

	T-E Index.
A' Tropical . . . . .	128 and above
B' Mesothermal . . . . .	64 to 127
C' Microthermal . . . . .	32 to 63

<sup>1</sup> *China's Geographic Foundations* (1934), p. 69.

<sup>2</sup> 'The Climates of the Earth.' *Geographical Review*, Vol. XXIII, 1933, pp. 433-40; see also *Ibid.*, Vol. XXI, 1931, pp. 633-55.

D'	Taiga	.	.	.	.	.	16 to 31
E'	Tundra	.	.	.	.	.	1 to 15
F'	Perpetual Frost	.	.	.	.	.	0

In addition four types of seasonal distribution of effective precipitation are distinguished :

- r rainfall abundant at all seasons.
- s rainfall scanty in summer.
- w rainfall scanty in winter (w' = rainfall scanty in spring).
- d rainfall scanty at all seasons.

Thus theoretically  $5 \times 6 \times 4$  or 120 possible climates exist. Certain combinations are eliminated by definition and Thornthwaite finds there are 32 actual climatic types in the world. His scheme for Asia is shown approximately in Fig. 18B, and the climates present are as follows :

1. AA'r Equatorial forest belts.
2. AB'r Part of Kyushu (Japan).
3. AC'r Eastern mainland of Japan, coast north of Vladivostok.
4. BA'r Absent in Asia.
5. BA'w Monsoon (deciduous) forest belt of south-eastern Asia and Burma, Ceylon, Java.
6. BB'r Interiors of large islands of East Indies, Korea, Japan, Caucasus.
7. BB'w Southern China, Assam, Formosa.
8. BB's Absent in Asia.
9. BC'r Hokkaido, Sakhalin.
10. BC's Absent in Asia.
11. CA'r Absent in Asia.
12. CA'w Most of Peninsular India, interior of Indo-China.
13. CA'd Absent in Asia.
14. CB'r Absent in Asia.
15. CB'w Dry belt of Burma, slopes of Himalayas.
16. CB's Absent in Asia.
17. CB'd Coastal strips of Asia Minor, south-western Arabia.
18. CC'r Absent in Asia.
19. CC's Absent in Asia.
20. CC'd Russian grassland belt, Manchuria.
21. DA'w Thar Desert (part).
22. DA'd Western margin of Arabia.
23. DB'w Punjab (part).
24. DB's Absent in Asia.
25. DB'd Plateaus of Anatolia and Iran, Syria and parts of Palestine.
26. DC'd Central Manchuria, much of heart of Asia.

27. EA'd Hot deserts of Arabia and Thar (part).
28. EB'd Turanian and Tarim Basins, Iranian Desert, Indus Valley (part).
29. EC'd Gobi Desert, northern Turanian Basin.
30. D' The Coniferous Forest or Taiga Belt.
31. E' The Arctic Tundra Belt, Tibet.
32. F' Absent in Asia.

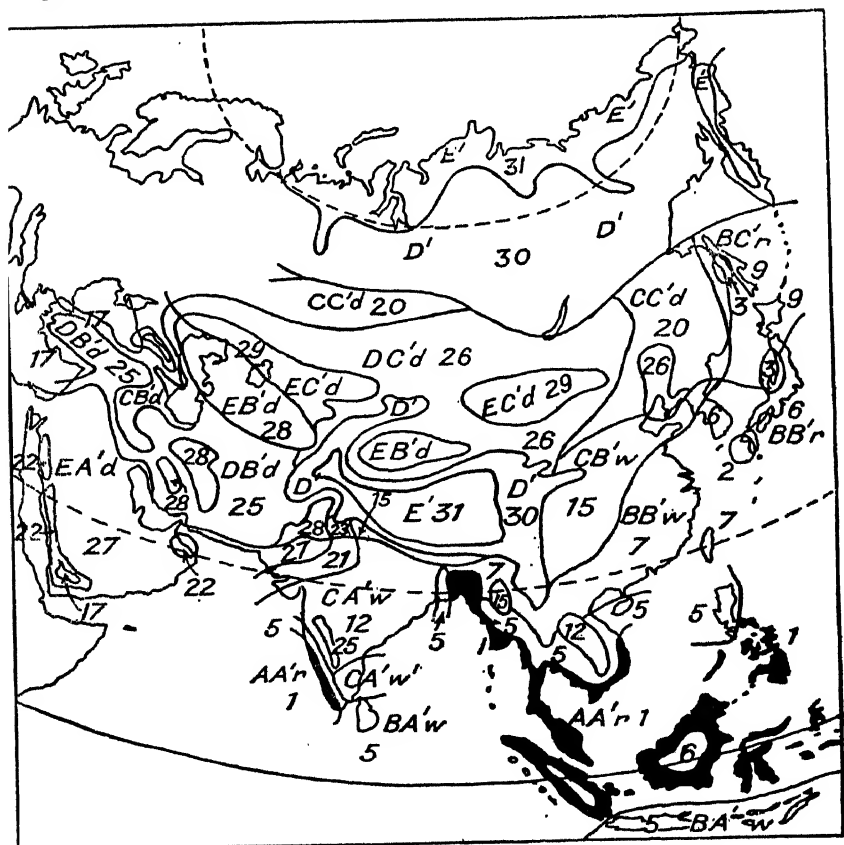


FIG. 18B.—Thorntwaite's climatic divisions of Asia.

Clearly this carefully considered scheme needs prolonged study, but it is by no means certain that it will be acceptable to the student of the geography of Asia. As it stands it produces too many strange bedfellows and there are far too many anomalies. There are vast differences between the climate of the Ganges Delta and Singapore (if vegetation is the criterion the rubber tree proves this), but why should Ceylon be relegated to an

entirely different group with which neither its climate nor vegetation agrees (note the distribution of the teak tree, for example)? Is the wind-swept plateau of Anatolia rightly grouped with the orange-grove country of Palestine? Is the climate of Korea and the slopes of the Caucasus really comparable with the interior of Borneo? Perhaps a more fundamental objection to the classification is the implication that forest passes to grassland with decreasing precipitation efficiency. Actually trees demand a deep-seated water supply; grass a superficial supply in the growing season.

## CHAPTER IV

### THE VEGETATION OF ASIA

It will be necessary to deal in some detail with the natural vegetation of the countries of Asia in the sequel, and it is only possible here to give the very broadest outline. Even minor variations in rainfall are reflected so intimately in the vegetation that generalized descriptions are apt to convey entirely false impressions. For example, almost untouched evergreen rain forests, actively exploited timber forests, dry scrublands and thorn-bush deserts are all equally characteristic of Asia alone.

Broadly speaking, the major climatic divisions have each their dominant type of vegetation. Within those divisions rainfall<sup>1</sup> is the first factor in the determination of major variations in the lowland vegetation; soil, which is itself largely a product of climatic conditions, determines local variations.

It will be convenient, therefore, to review briefly the natural vegetation of Asia by taking each of the major climatic regions considered in the last chapter.

**The Equatorial Regions.** The natural vegetation of the equatorial belt of Asia is lofty, evergreen forest of hardwood species. The forest occurs in huge sweeps from the seashores to the hill-tops, interrupted only occasionally by areas, such as hill ranges, where the soil is insufficient to support forest growth, or by tracts where bamboos, grasses or other herbaceous vegetation have waged a successful war against the forest—usually as a result of man's intervention. The decrease of temperature, due to elevation, rarely affects vegetation in Equatorial regions below 5,000 feet; its influence is mainly due to the occasional frosts above that level. The Equatorial forests which have seized upon the popular imagination are the gloomy, vault-like forests of the Amazon, where the canopy is so dense that no sunlight, and indeed very little light at all, penetrates to the forest floor—an almost lifeless waste of decaying vegetable matter. Forests of this type rarely, if ever, occur in Asia. The canopy is dense, but sufficient light penetrates to the floor

<sup>1</sup> More correctly available moisture.

of the forest to permit the growth of a lower storey of trees, bamboos and canes, and often of a luxuriant ground vegetation.

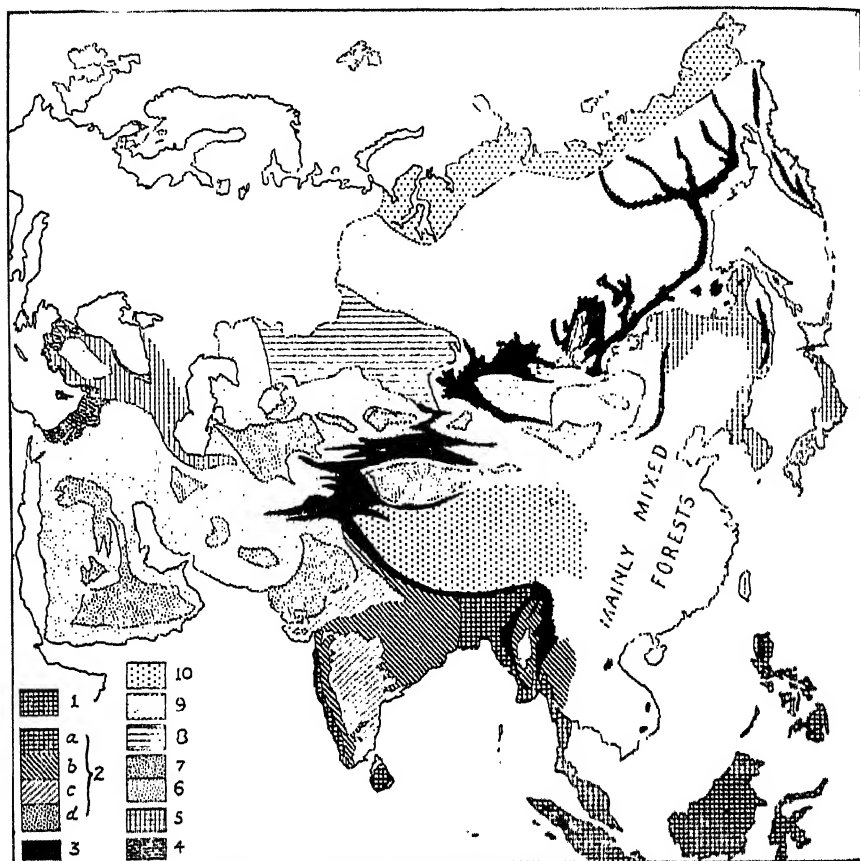


FIG. 19. —The natural vegetation of Asia.

1. Equatorial vegetation--wet evergreen forests.
2. Monsoon vegetation *a*--wet evergreen forests,  
*b*--deciduous monsoon forests,  
*c*--thorn woodland and scrub,  
*d*--desert.
3. Mountain vegetation.
4. Mediterranean vegetation--evergreen woodland.
5. Mixed coniferous and hardwood deciduous forests.
6. Dry steppes and steppe-deserts.
7. True desert.
8. Temperate grassland (steppe) and parkland.
9. Tundra or coniferous forest.
10. Tundra and Tibetan alpine vegetation.

The larger trees are nearly all of hardwood species, tall and unbranched, tapering but very gradually and frequently exceeding 200 or 250 feet in height. Many of the trees are furnished with

plank-buttresses', important supports for their great height. The trees are rarely gregarious; an acre of forest commonly contains but one or two specimens of a single species. This creates a fundamental difficulty in the commercial exploitation of the forests; the extraction of a single species, however valuable, may be wellnigh impossible; on the other hand, clear felling produces an immense variety of timbers of which the quantities of any one are but limited. A feature of the forests of South-eastern Asia is the large proportion of the trees which belong to the natural order, *Dipterocarpaceæ*, nearly all of which have winged seeds.<sup>1</sup> The numerous epiphytes, especially ferns and orchids, which grow high up on the trees, are characteristic, as are the innumerable lianes or woody climbers. Often the trees by which the latter reached the canopy of the forest have died and decayed, leaving the lianes hanging from the heights, with snake-like coils trailing over the ground. The animal life of the forests is often concentrated in the tree-tops, one hears the groups of chattering monkeys rather than sees them. The interior of the Asiatic forests, however, is far from lifeless, and among the denizens is the Indian elephant. Like the Equatorial forests of the Congo and Amazon, those of Asia have formed the last refuge for primitive mankind—the Veddas of Ceylon, the Semang of Malaya and the numerous tribes of Borneo. A. R. Wallace's famous classic, *Island Life*, gives an excellent account of the Equatorial regions of Asia.

The grassy stretches of the upland areas have already been mentioned, there remain two characteristic types of vegetation to be noted. The mangrove swamps of muddy coasts and deltas occur between tidal limits, and include an important variety of trees—some reaching heights of 200 feet (as do the Kanazo forests of Burma), although the true mangrove swamps consist of trees of only about 15 to 30 feet in height. They are provided with aerophores which project through the muddy soil and permit air to reach the roots during the period of low tide.<sup>2</sup> Then there is the vegetation of sandy coasts, where a narrow strip of the graceful *Casuarina* trees is very common, though the coconut has become so firmly established as to be regarded as 'natural' vegetation.

**The Monsoon Regions.** The natural vegetation of monsoon regions is forest, but it should be noted that the rainfall, coming

<sup>1</sup> See E. D. Merrill, 'Distribution of the *Dipterocarpaceæ*', *Philippine Jour. of Sci.*, Vol. 23, 1923, pp 1-33.

<sup>2</sup> A description of different types of mangrove forest, applicable to wide areas in Asia, will be found in L. D. Stamp, 'The Aerial Survey of the Irrawaddy Delta Forests', *Journal of Ecology*, 1925.

as it does in the hot season, provides a climate which is not wholly inimicable to grass. The frost-line is lower than in the Equatorial belt ; it averages 3,000 feet above sea-level in Burma and is rather lower in Northern India. Below the frost-line the vegetation is tropical ; its actual character depends upon the amount of the rainfall. Where the rainfall is more



FIG. 20.—The forests of Asia (based on maps published by Zon and Sparhawk).

than 80 inches per annum, evergreen, broad-leaved rain forest, so closely comparable with that occurring in Equatorial regions as to be identical, occurs. Where the dry season is a long one, certain species may not thrive—for example, the imported rubber, *Hevea braziliensis*, will not flourish in Bengal, though the rainfall is in many parts over 80 inches and evergreen forest is the natural vegetation.



Where the rainfall is between about 40 and 80 inches—in localities favoured as regards soil and underground water supply even where it is as low as 30 inches per year—the typical monsoon forests' are found. They are broad-leaved forests which become leafless in the hot season, bursting into flower and then into leaf just before the rains break in earnest. Some of the trees, such as the sal of India (*Shorea*), are gregarious; in other cases two or three species form co-dominants (as in the 'indaing' forests of Burma, where *Dipterocarpus tuberculatus* and *Pentacme suavis* are the two dominant trees), but in most monsoon forests there are numerous species and pure stands of any one species are rare. This is the case with the 'teak forests', where teak (*Tectona grandis*) forms but a small percentage of the total number of trees. The number of species is not as large, however, as in the Equatorial forests. The monsoon forests, being the home of the teak and sal, as well as other important timbers, such as the Burma ironwood (*Xylia dolabriformis*), are economically far more important than the Equatorial forests. The timbers are nearly all hardwoods, but more tractable, generally speaking, than those of the latter forests. The monsoon forests are more open; there is often a dense undergrowth, especially of bamboos, and in the drier types of grass. It is a common practice, in reserved or scientifically managed forests, to burn off the undergrowth in the dry season by simply setting fire to it—it is rarely that the fire becomes sufficiently intense to damage the larger trees. The loss of leaves, it should be noticed, takes place in the dry, hot season, and not in the cold season as in temperate forests. Just when man and beast most desire shelter the forest gives none: anyone who has walked through the drier type of monsoon forest in March or April will never forget the still, lifeless air, the motionless, deathly still trees and the shimmering heat which rises from the brown baked ground, blackened by recent fires suggesting in earnest the appellation 'stinking hot'.

Where the rainfall drops below 40 or 30 inches, it is, in general, too dry for the adequate growth of forests. Their place is taken at first by a woodland of thorny trees—amongst which *Acacia* is usually conspicuous—the trees decreasing in size as the dryness increases, till one has a scrubland of scattered thorny bushes, 4 to a dozen feet high, separated by wide areas of ground—bare and brown for half the year, covered with green grass and herbs for the few months of the rainy season. This type of vegetation is, it should be noted, an impoverished woodland, but bears very close resemblance to the African savana or tropical grassland with scattered trees. It is noteworthy that many

of the species found as low bushes—such as *Acacia catechu* and *Acacia leucophylla*—occur under more favoured conditions as forest trees.

Where the rainfall drops below 20 inches the conditions may be said to approach those of semi-desert, succulent plants such as *Euphorbia* becoming important.

In monsoon lands one finds tidal or mangrove forests as in the Equatorial regions and fringing forests of *Casuarina* on sandy shores. Riparian forests are characteristic of the larger rivers in several parts of monsoon lands.

Hill forests of monsoon countries fall broadly into two classes—the evergreen, broad-leaved forests in which various species of oak (*Quercus*) are usually important and coniferous forests with such species as *Pinus longifolia*, *Pinus excelsa*, *Cedrus deodara*, *Picea* and *Abies*.

**The Temperate Monsoon Regions of China and Japan** (East Asian climate). It is more than a little difficult to say what is the natural vegetation of China. Broadly it may be described as temperate forest, but deforestation has been carried on to such an extent that forests are now found only in three main regions—the Nan Shan or Nanling Range; the Tsinling Range; and the Western Highland region. The general character of the forest is that of broad-leaved; frequently evergreen, trees mixed with conifers, especially in the higher parts. There are large areas of bamboo, whilst the widely distributed national tree of China is the Tung or wood-oil tree (*Aleurites cordata*). The oil is obtained from the nuts, and is poisonous when fresh. Another characteristic tree is the Varnish tree (*Rhus vernicifera*), the tree which yields the lacquers of the Far East, the varnish being obtained by tapping.

In Japan, as detailed in the section on Japan, the south of the country is occupied by warm temperate forests with evergreen and deciduous broad-leaved hardwoods mixed with coniferous; further north conifers and deciduous hardwoods predominate.

**The Manchurian Region.** Ecologically this region embraces most of the hilly parts of Manchuria and stretches into the adjoining parts of Russia. Grassland covers the lowlands, but forest covers all hilly tracts. Like the forests of the corresponding climatic region in North America, conifers and hardwoods are mixed. Conifers include spruce, silver fir, red pine, and larch, but the most valuable economically is the Manchurian pine (*Pinus mandshurica*). Hardwoods include oaks, ash, alder, beech and others. Further details will be found under Siberia.

**The Desert Regions.** It is impossible to attempt a description of the varied types of vegetation which occur in the hot and temperate deserts of Asia. Broadly it may be said that the vegetation in any given region is an impoverished presentative of that found in neighbouring regions more favoured by Nature in water supply. A distinction may be made between true deserts, such as the heart of the Tarim basin or the Ruba' el Khali in Southern Arabia, which are virtually lifeless, and the tame deserts which support a measure both animal and vegetable life, especially in good rainfall years.

**The Mediterranean Regions.** The xerophytic evergreen Mediterranean woodland of small trees with their numerous devices protective against excessive transpiration in the hot dry summer is well developed in South-western Asia. The small leaves of the olive, grey-green, with their protective covering of silky hairs, the leathery leaves of the myrtle or laurel, the bright green, waxy leaves of the orange, the excessively long roots of the vine suggest the types of modification found in the Mediterranean woodland. The ground vegetation is often reminiscent of English heathland or moorland, with its low shrubs, wealth of herbaceous plants in spring, but comparative absence of grass. One associates the reduction of leaf surface found in conifers with protection against cold, but it serves equally well as a protection against excessive loss of moisture in hot regions, and hence coniferous woodland, especially of other small species, is also seen in Mediterranean regions.

**The Grassland Regions.** Grassland is typically developed in Asia in the south-west of Siberia and again as a fringe to the deserts and semi-deserts of the Mongolian plateau as well as in the lowlands of Central Manchuria. The Mongolian and Manchurian steppes may be described as the most undeveloped areas of temperate grassland in the world, and as such they have a special interest to the surrounding nations of Japan, China and Russia. The typical vegetation is a low growth of grass; the grassy sward is often interrupted by bare spaces, the grasses usually grow in tufts, and the tufts become further apart in drier regions. Where creeping species are present they produce a more evenly covered surface. Steppe grasses have narrower leaves than those of damp meadowlands, and many species have leaves which roll up in dry weather. Small woody plants with small leaves, herbaceous, tuberous and bulbous plants are common.

Southwards the steppes of South-western Siberia grade gradually into steppe-desert; northwards they pass into a very

fertile stretch of parkland which affords a gradual passage to coniferous forests. Steppeland of a kind rather different from the typical area reappears in such areas as the Anatolian plateau.

**The Cold Temperate Regions.** The cold temperate regions of Siberia are clothed with coniferous forest, of which a description is given later under Siberia. From the main belt of forest tongues penetrate southwards along the mountains of Central Asia. The extreme climate does not encourage rapid growth; the trees are smaller and poorer than in corresponding regions of North America.

**The Arctic Regions.** Beyond the last stunted trees, the cold desert or the tundra dominates the northern fringe of Asia. Only in a few more favoured localities do willows and dwarf shrubs exist; elsewhere the predominance of mosses and lichens and of dwarf xerophilous plants is the characteristic feature. In some places mosses, especially *Polytrichum*, are dominant, in drier places lichens, giving either a moss-tundra or a lichen-tundra. Swampy depressions are numerous, and a scanty peat may carry a layer of sphagnum; sheltered spots exposed to the sun's rays may be rich in flowers. But the summer is short and sharp; for the greater part of the year the ground is completely frozen.

## REFERENCES

General works giving references to literature include De Martonne, *Traité de Géographie physique*, 2nd Ed., Vol. III (Paris: Colin, 1927); Schimper, *Plant Geography* (Oxford, 1903); Zon and Sparhawk, *Forest Resources of the World* (New York: McGraw Hill, 1923). Detailed references will be found under countries.

## CHAPTER V

### THE POPULATION OF ASIA

ASIA, in addition to being the largest continent, has also a larger population than any other. Yet the distribution of the people is curiously irregular. The majority of the people of Asia are found in two countries—

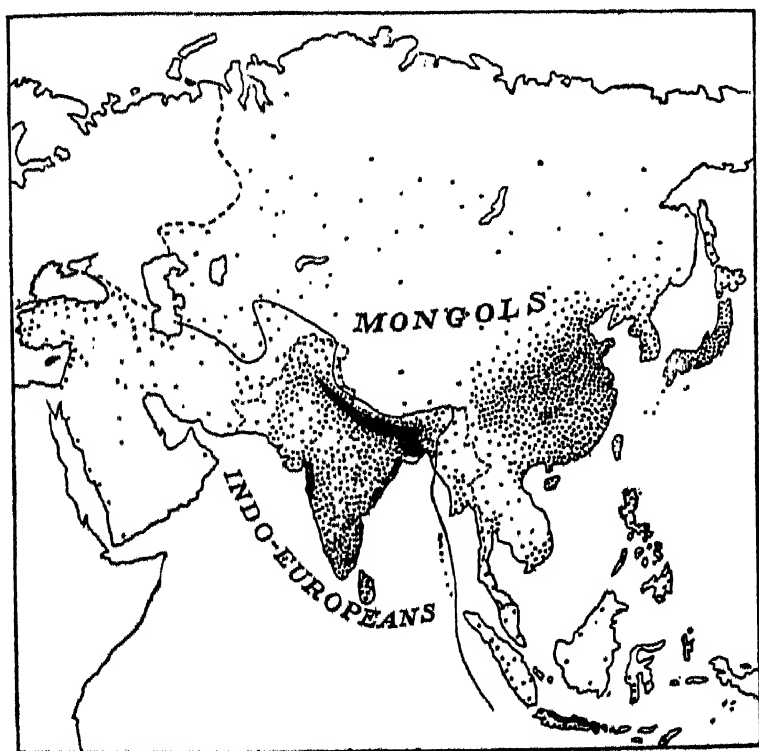


FIG. 21.—The population of Asia.

showing the concentration of people in the monsoon lands excepting Indo-China. Each dot represents approximately 500,000 people.

India, with an average density of 195 and a total population of about 353,000,000; and China, with a total population of probably 400,000,000 (density, 260). Three other areas, and three only, may be described as densely populated—Japan,

with a population in the Empire of 90,400,000 (1930) (density, 347); Java, with 41,700,000 (1930) (density, 817); and Ceylon, with 5,300,000 (1931) (density, 208).

On the other hand, vast stretches of Asia have a population meagre in the extreme. The million square miles which make up the peninsula of Arabia have probably only about 7,000,000 people; the vast stretches of Siberia have a population density of under 5; much of Central Asia under 1. Even the East Indies, excluding Java, can only boast of a population density of a little over 20.

There is no doubt that climate is the primary determining factor in the present distribution of population.

The Tropical Monsoon, the China type and the China type as modified in Japan, are the climates which, by affording an abundance of food with a relatively small expenditure of labour, are those favouring a dense population. Within these climatic regions topography—and soil fertility so closely bound up with it—plays a leading part in the actual distribution; the crowded plains and the empty hills of China exemplify this to the full. It is scarcely too much to say that the great majority of the most densely peopled tracts of Southern and Eastern Asia are alluvial plains.

Within the monsoon tract of Asia there are anomalies which deserve attention. Even a very simple map like Fig. 21 brings out the relative emptiness of Burma, Siam and Indo-China, which climatically are just as favoured as their densely populated neighbours India and China. Inaccessibility, illustrated by the Arakan Yoma cutting off the fertile Irrawaddy Plains from India and by the mountains of Annam cutting off the fertile plains of Cambodia and Siam from China, is in the main responsible, but there are social and economic factors, outside the realm of geography, also at work. In a later chapter we shall examine the social and religious systems which bind the Chinese to his native soil and prevent emigration.

In the East Indies, with their Equatorial climate, one is struck at once by the contrast between Java on the one hand and the remainder of the archipelago on the other. The circumstances which have led to the present density of population in Java will be examined later, but the extraordinary fertility of the volcanic soils is one important factor.

Turning now to the races of Asia, the first outstanding feature is the function of the great mountain barrier, already emphasized in connection with climate, which clearly separates the two great divisions of mankind represented in the continent.

The plateaus of Central Asia have probably formed a con-

tinental mass at least since the Mesozoic period ; they were land before the Himalayas had even begun to appear. One is justified in assuming—and indeed recent discoveries lend much support to the assumption—that Central Asia formed one of the great world centres of evolution and dispersal of the mammals. In this category comes man, and it is not improbable that man evolved from simian stock somewhere in Central Asia during

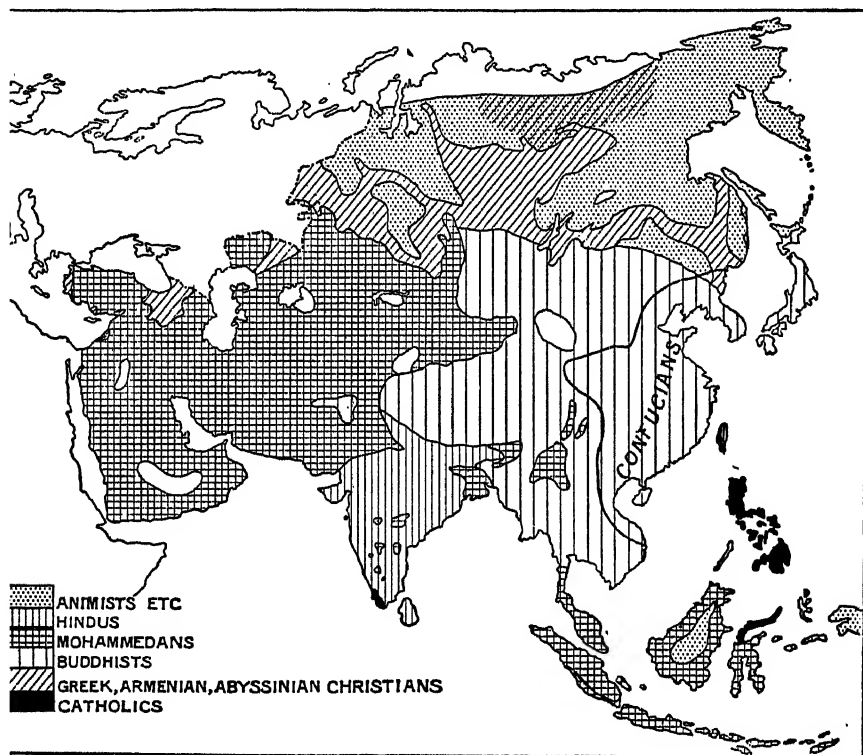


FIG. 22.—The Religions of Asia.

Shintoism also is important in Japan, Taoism in China.

the Tertiary period. The on-coming of the Glacial period, which must have greatly affected the climates of Central Asia, probably acted as a spur to human migrations ; the close of the Glacial period saw in Central Asia much moister conditions than exist at present<sup>1</sup> ; the shrinking of ice-caps, the retreat of mountain

<sup>1</sup> These statements are made on general grounds ; they do not affect the much-debated question as to whether Central Asia is still becoming drier or has done so in historic times. Kropotkin long ago recognized the gradual desiccation of most of Asia since glacial times (*Geog. Jour.*,

glaciers gradually resulted in a diminution of water supplies; glacial lakes became marshes and then prairies and finally even arid deserts, and so the inhabitants were driven to seek fresh lands. Of these early movements of people there are but the slightest traces. In an instructive little book, Dr. A. C. Haddon has dealt with the fascinating subject of the wanderings of peoples in Asia.<sup>1</sup> Amongst the prehistoric migrations Haddon shows the Nordics (the peoples of Northern Europe) moving westwards from Central Asia; the Mongols south-eastwards to China; and the Alpine race from Turkistan through Asia Minor to South-central Europe.

It is impossible in the space available here even to summarize the present distribution of races in Asia. A brief but clear account will be found in Haddon's *Races of Man and their Distribution*.<sup>2</sup> A more recent and elaborate account, somewhat abstruse to the non-anthropological reader, has been given by L. H. Dudley Buxton.<sup>3</sup> Haddon distinguishes three main divisions of mankind:

Ulotrichi (woolly-haired: corresponding roughly to the black or negro race);

Cymotrichi (wavy-haired: corresponding roughly to the brown and white races);

Leiotrichi (straight-haired: corresponding roughly to the yellow races).

The Ulotrichi in Asia include certain very primitive pygmy races—the Andamanese, the Semang of Malaya and Sumatra, and the Aetas of the Philippines—as well as the larger Papuans of New Guinea.

The Cymotrichi include long-headed (dolichocephalic), medium-headed (mesaticephalic), and broad-headed (brachycephalic) groups, further subdivided by skin colour:

Dolichocephalic Cymotrichi, with dark brown to nearly black skins, include the Veddas of Ceylon, the jungle tribes (Pre-Dravidian) of Peninsular India, Malaya, Sumatra, and Celebes, and also the Dravidians of India.

Dolichocephalic Cymotrichi, of intermediate shades, include the Indo-Afghans, who populate most of South-western Asia

XXIII, 1904, pp. 176, 331, 722). Ellsworth Huntington, in his famous book, *The Pulse of Asia* (1907), developed the thesis that the secular desiccation had been varied by cyclic fluctuations; in later works he has traced the influence of minor climatic pulsations and rainfall cycles in the history of certain peoples. See also Chapter IX in Part II.

<sup>1</sup> *The Wanderings of Peoples* (Cambridge University Press, 1911).

<sup>2</sup> Milner, n.d. (c. 1911), rewritten and published by the Cambridge Press, 1924.

<sup>3</sup> *The Peoples of Asia* (Kegan Paul, 1925).



and Northern India, the Indonesians of the East Indies; the Arabs and Jews.

Mesaticephalic Cymotrichi include the indigenous Ainu of Japan.

Brachycephalic Cymotrichi include the Armenians.

The Leiotrichi include practically all the inhabitants of Northern and Eastern Asia—the straight-haired, yellowish- or yellowish-brown-skinned races in certain cases only with eyes set obliquely, popularly and loosely called Mongols. The peoples of Northern Siberia form one group, the Tungus and Manchus another, the Chinese proper a third, the Turki peoples a fourth, the Ugrians of Western Siberia a fifth, the Tibeto-Chinese (including Malays) a sixth.

This is but a bald statement of one classification of the peoples of Asia. The geographical interest lies in tracing the factors which have played a part in the differentiation of these races, the factors which have induced racial movements and the factors which have determined the direction of those movements and the preservation of remnants of early primitive tribes. We shall have occasion, in the latter part of this book, to deal with the peoples of certain areas, but it is only by attempting to trace human migrations on a good physical map of Asia and by plotting the location of the primitive tribes and the great civilizations that one comes to appreciate the great part which the orography and the climatology of Asia have played.

## CHAPTER VI

### THE EUROPEAN EXPLORATION OF ASIA.<sup>1</sup>

**L**ONG before Europe had discovered Asia, Asia had discovered Europe. In the dawn of history the merchants of Phoenicia had pushed westwards through the Mediterranean for trade and even beyond the Pillars of Hercules (Straits of Gibraltar) to Britain. There is no doubt that there was regular intercourse between the Minoan civilization and the Levant, while in the seventh and sixth centuries B.C. the Greeks had established colonies along the shores of Asia Minor. The Greeks, by their close proximity to Asia and the high standard of civilization they had attained, were the natural pioneers in the discovery of Asia. The Persian menace served to unite the various independent cities of Greece under the single leadership of the Macedonian, Alexander, who was destined to carry out the conquest of the Persian Empire, already planned by his father, Philip of Macedon.

The first historic expedition by a European into Asia was made by Alexander the Great, who, in one of the greatest of military undertakings, marched through Asia Minor, defeating the armies of Darius at Issus and so gaining access to Syria and the Phœnician coast, later across the Tigris to the decisive victory of Arbela and on through Ecbatana, Susa and Persepolis to the valley of the Oxus. Not content with the conquest of the Persian Empire, Alexander by way of Kabul crossed the Hindu Kush in 327 B.C. and advanced to the Indus Valley. Having penetrated as far as the Bias River at its junction with the Sutlej, he returned through the deserts of Babylonia which he had left seven years previously. Alexander was no mere world conqueror whose conquests had no ulterior motive. He appears to have aimed at merging Asia with Europe, and with that end in view planted colonies and military settlements and encouraged his soldiers to intermarry with the conquered. Evidence of Alexander's invasion can be seen in place-names, notably in

<sup>1</sup> This chapter is by Miss D. M. Fisher, B.A., and the authors are much indebted to Professor Eileen Power, D.Litt., for notes on the subject-matter.

Samarqand, originally Samarkander, a perversion of Alexander. With the establishment of the Graeco-Bactrian Kingdom by Alexander and his successors the lands beyond the Euphrates bore the ineffaceable mark of the Hellenistic culture, seen in buildings and sculpture, especially the remarkable Buddha statues.

As the Greek dominance of the Western world gave place to Roman, gradually Europe became better acquainted with the

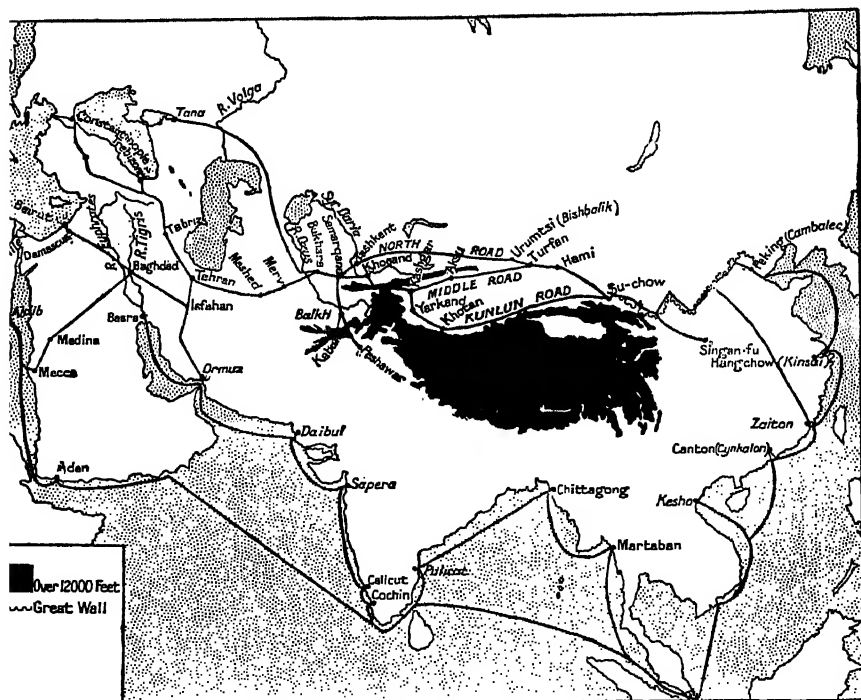


FIG. 23.—Mediaeval trade routes between Europe and the Far East.

(Mediaeval names where differing from modern names are in italics.)

East, though not for centuries yet did Europeans learn of the land that gave them their much-prized silk. Silk was probably the earliest cause of intercourse between Europe and China. Virgil, Horace and others speak of the Seres, and the 'Land of the Seres' was one of the earliest names for China used by Western nations. The long-continued Parthian Wars had the effect of jeopardizing Rome's supply of silk, since the Parthians inhabited lands through which the early trade in this commodity was carried on.

The main routes by which the peoples of Europe and Asia gradually came to know one another have remained substantially the same throughout historic time. Routes to the East were either by sea or land. There were two main sea routes :

(1) From the central highway of trade, the Mediterranean, and the Black Sea, by way of the Euphrates to the Persian Gulf, along the Malabar Coast to Ceylon, across to the East Indies and so to the south coast of China.

(2) The Mediterranean to Egypt, up the Nile, across to the shores of the Red Sea and via the Red Sea to Ceylon, where the other route was joined. The sea route received great impetus about A.D. 50, when a Roman sea captain is said to have discovered the periodicity and hence the importance to sailing vessels of the south-west monsoon. Throughout ancient and mediaeval times the sea routes continued to be important trade channels, especially for the spices of the East, while the silk was carried by land caravan. The sea routes were considered safer, chiefly owing to the depredations across Central Asia of successive barbarian hordes. Certain articles, notably Chinese porcelain, could withstand sea-travel better than the jolting inseparable from a land caravan.

The great land routes are more easily traced from east to west than from west to east.<sup>1</sup>

(1) The South or Kunlun Road. Starting from Singan-fu, the old capital, and in later times from Peking, this road followed the Great Wall to the modern Suchow, then across the dreary desert of the Lop Nor district and along the foot of the Kunlun Mountains to Khotan, Yarkand and Kashgar, an important junction of several roads. From Kashgar the road ran north-west to Khoqand, thence to Samarkand and Bukhara, the meeting-place of all the transasiatic routes. From Bukhara access to Europe was either south of the Caspian by way of Tabriz through Asia Minor to the Black Sea and Constantinople, or across Persia and the Tigris and Euphrates to the Mediterranean ; or thirdly, during the thirteenth and fourteenth centuries, from Bukhara across the Oxus and north of the Caspian to the Volga and northern shores of the Black Sea.

(2) The Middle or South Tien Shan Road. This road diverged from the first at the modern Suchow and went north to Hami and Turfan ; thence to Aqsu and south-west to Kashgar, joining the first road.

(3) The North or North Tien Shan Road. This branched off from the Middle Road at Hami or Turfan, running on to Urumtsi,

<sup>1</sup> See also Part II, Chapter IX. Reference may also be made to *Travel and Travellers of the Middle Ages* (London : Kegan Paul, 1926).

north again of the Issyk Kol, on to Tashkent, across the Sir Darya (Jaxartes) to Samarcand, where it joined the other roads.<sup>1</sup>

That these roads were of extreme importance from very early times is certain. Along them travelled people, religions

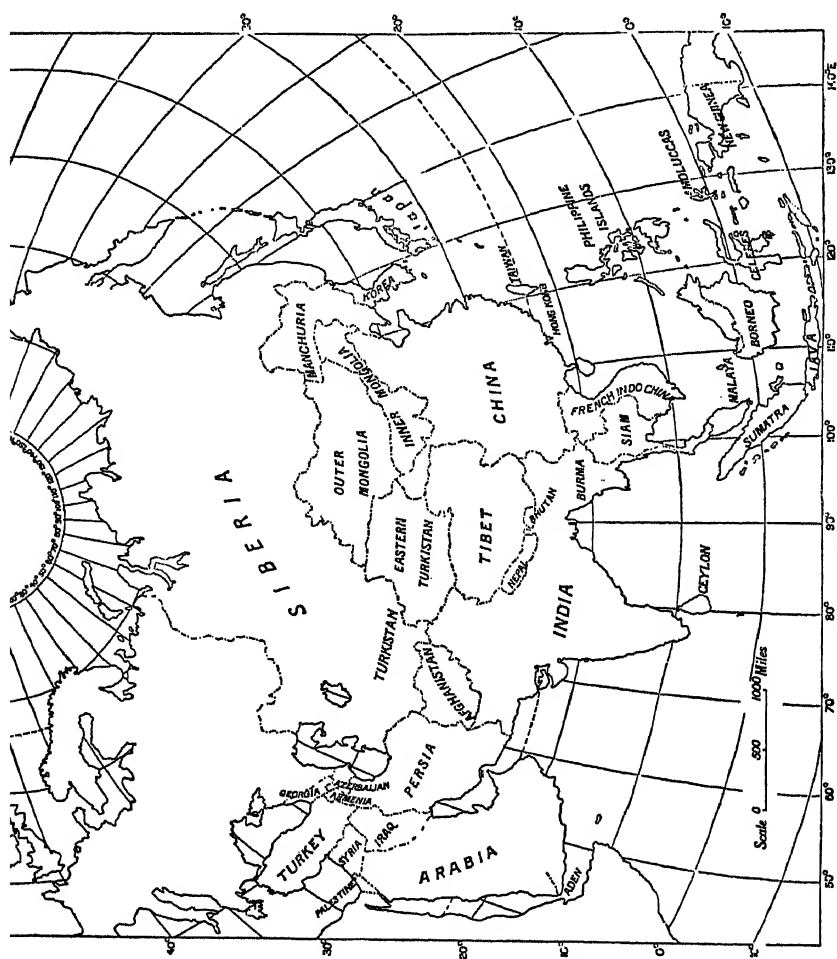


Fig. 24.—The political divisions of Asia.

and, above all, trade. The direction of earliest trade tended chiefly to be from east to west, partly because Chinese and

<sup>1</sup> In addition to these routes there were and still are the Mongolian routes and Dzungarian Gap routes of which an account is given in Part II, chapter IX.

Indian merchants were the pioneers of trade with the West and also because of the tremendous influence of the westward trend of nomadic hordes : Huns, Seljuks, Tartars and Ottoman Turks all threatened the peace of Europe at different times. By the dawn of the Christian era, however, Europe had become inspired with the desire to know more of the Land of the Seres, which soon came to be known as China from the feudal State of Ts'in. In A.D. 196 there is record of an envoy of the Emperor Marcus Aurelius in China. Christianity spread into Asia early in the fourth century, when there was an episcopal see in Merv (Russian Turkistan). The spread of Christianity during the fifth and sixth centuries was Nestorian in form. Nestorianism, in fact, soon became the only form of Christianity found in India and China. Meanwhile trade between east and west was increasing under the western dominance of the Byzantine Empire. The Western world had long coveted the secret of the Chinese silk manufacture ; at last it was known through the medium of monks who smuggled in silkworm eggs.

The Byzantine emperors spent a good deal of their time trying to check the inroads of the Persians on their eastern frontier ; but a more serious foe was yet to come in the Moslem peril. The successors of Mahomet in the seventh and eighth centuries established an empire stretching from Samarcand to Spain, and made their capital, Baghdad, the richest emporium of its day, commanding routes by sea and land. The power of the Mahommedan Arabs in time gave place to that of the Seljuk Turks. This branch of the Asiatic hordes appeared near the river Oxus at the end of the tenth century, and with the collapse of the Mahommedan Empire they took their opportunity to push westwards. By 1071 the Seljuks had captured Jerusalem and were persecuting pilgrims, who by this time journeyed from all parts of Europe to the sacred spots of the Holy Land. Thus was precipitated the great crusading movement as an offensive of the West against the East. Among the many important results of the Crusades may be mentioned the immense impetus that was given to missionary and trading enterprise in the Far East. Missionary expeditions beginning with St. Francis in the thirteenth century and travels of merchants and others throughout the Middle Ages gradually brought the great unknown continent of Asia into closer touch with the nations of Europe. Incidentally, the Crusades had the effect of opening up the sea-route to the East by the Mediterranean and Red Sea and also the Persian Gulf, routes which had for long been in the hands of the Moslems, controlling as they did the western outlet at Gibraltar and the eastern at the Nile delta and Persian

Gulf. Of the revived maritime trade Venice received the lion's share, closely rivalled, it is true, by Genoa.

Meanwhile contact between Europeans and the peoples of India and China was furthered on land by the widespread conquests of the Mongols, who were united at the beginning of the thirteenth century under the greatest of barbarian leaders, Genghis Khan. First Eastern and then Western Asia succumbed to the Mongol advance, until by 1259 lands from the banks of the Yellow River to the Danube and from the Persian Gulf to Siberia owed allegiance to the Mongols. European travellers were now secure from the Moslem danger.

The first traveller was a Franciscan monk, John of Plano Carpini, who was sent by Pope Innocent IV with a letter to the Grand Khan. He reached Karakorum, but returned after two years with a haughty answer to the Pope's message. In 1254 another Franciscan, William of Rubruck, was sent to the court of Kublai Khan. The next travellers were of more importance. Two brothers, Nicolo and Maffeo Polo, Venetian merchants, left Constantinople in about 1251 and reached the court of Kublai Khan in Cathay. They were well received and asked by the Grand Khan to deliver a message to the Pope with the intent that numbers of missionaries might be sent to his people. They returned to Acre in 1269 to find the Pope had died. In 1271 the brothers set out again, taking with them Marco, Maffeo's son. They followed the sea route to Acre, then went via Baghdad to Ormuz, north through the Kerman desert and over the Pamirs to Kashgar, following the South Road to Peking, which was reached in May, 1275. Marco was taken into the Khan's service and sent on his behalf to Shansi, Shensi, Szechwan and Yunnan. He was even made ruler over Yangchow, 'the only case recorded in history of a European being made a "mandarin" over Chinese territory'. The Polos contrived at last in 1292 to return. They followed the sea route to the Persian Gulf, being delayed in Sumatra, and arrived in Venice in 1295. Masfield says of Marco Polo—'that he created Asia for the European mind'. During subsequent years the travellers are almost too numerous to mention.

In response to the request for missionaries, John of Monte Corvino was sent in 1289 with messages to all the Khans of Asia. He went by way of the Persian Gulf to the Malabar coast and the Malay Peninsula, and finally reached Peking in 1292 or 1293. John's mission met with considerable success. In 1307 he was joined by colleagues designated 'bishops' by the Pope with authority to consecrate John Archbishop of Cambaluc (Peking). The letters of John of Monte Corvino bear witness

to the progress of Christianity in China, and show that there were 6,000 or more converts in Peking, while missions also existed at Zaitun (modern Ch'ungchow) in the south-east in Fukien, as well as at many places along the caravan route into Europe. In 1318 Odoric of Pordenone, a friar from Padua, journeyed by the sea route from Constantinople. He took, however, the land route from Trebizond through Persia to Ormuz, a route which at this time was favoured because the Mameluke Sultan of Egypt made the journey via Suez a dangerous one. Odoric visited Tana near Bombay, sailed along the west coast of India to Ceylon, across to Sumatra, Java, Cambodia, and so to Canton; after visiting the Chinese ports he spent three years with John of Monte Corvino in Peking. The return journey was by land through Shansi, Shensi, Szechwan and Tibet. He is said to be the first European to visit Lhasa. Others, missionaries and merchants, followed in the footsteps of the Polos to India and China until 1368, when Christian missionaries disappeared with the sudden overthrow of the Mongols. The accession of the Mings in China meant that the great land route was closed for approximately two centuries. At the end of the fourteenth century Tamerlane of Samarkand, a descendant of Ghengiz Khan, threatened to win the continent once more for the Mongols. He was prevented by death in 1405 from securing China.

The westward flow of yet another wave of barbarian Turks, the Ottomans, further imperilled Eurasian communication, and it remained for the sixteenth and seventeenth centuries to reopen the sea route to India and China. The Crusades had done so only temporarily. Could not the infidel obstacle be circumvented by another route? The question was answered by nothing less than the discovery of America and the Cape route to India. The 'quest of the Indies' occupied the minds of navigators for hundreds of years, years which witnessed a decline in the importance of the Mediterranean as a commercial highway, together with the loss by Italy of supremacy as a trading nation. While Italy's maritime power declined, that of Western nations not limited to the Mediterranean backwater developed; and so we find Spain, Portugal, Holland, England and France emulating one another for the wealth and trade of the East.

The last decade of the fifteenth century was a period of outstanding importance in maritime history. In 1486 Bartolomeo Diaz, a Spaniard, had sailed along the west coast of Africa and sighted the Cape of Good Hope. In 1492 Christopher Columbus, a native of Genoa, first sailed the Atlantic and discovered the West Indies for Spain, thinking he was on his way to China.



John Cabot, a Portuguese, sailed west under the patronage of the English king in 1497 and discovered Newfoundland. The following year Vasco da Gama, also a Portuguese, actually rounded the Cape of Good Hope, sailed some distance north along the east coast, crossed the Indian Ocean and reached Calicut six months after leaving Lisbon. This voyage definitely opened up a new sea-way to India. In the early sixteenth century the Spaniard, Magellan, circumnavigated the globe in an endeavour to find a way to the Orient round the extreme south of South America. The same incentive led Willoughby and Chancellor, Englishmen, in 1554, round the north coast of Europe to the White Sea. In 1557 Jenkinson, likewise aiming at Cathay, penetrated inland through Russia from the north and on to Bukhara.

Coming to the famous Elizabethan age, Sir Humphrey Gilbert and Martin Frobisher made efforts to find a North-West passage by way of North America to the East. This route was perhaps the one most eagerly sought at this period in history. Among many English explorers, Henry Hudson and William Baffin sailed in the same direction during the early seventeenth century. A publication by William Bourne in 1573 is of interest as showing five possible sea routes to China :

- (1) The Portuguese route, via the Cape of Good Hope.
- (2) The Magellan Straits route.
- (3) The north-west route—north of North America.
- (4) The north-east and north of Russia route.
- (5) The northern route (presumably via the North Pole).

In 1577-80 Francis Drake made his famous voyage round the world, following Magellan's route. In 1592 Sir John Burrough captured a Spanish vessel, the *Madre de Dios*, which revealed much in relation to commerce with the Far East. Soon after Benjamin Wood was sent with a letter from Queen Elizabeth to the Chinese Emperor asking for his protection to English traders. The expedition, however, failed to reach its destination.

Meanwhile English trade with the East had increased so much that Elizabeth had granted a charter to the Levant or Turkey Company, which had its headquarters at Aleppo.

Of greater significance was the formation in 1600 of the London East India Company, closely followed by a French East India Company. Indeed, the history of Eastern commerce during the seventeenth century is a record of great trade rivalry between English, Portuguese, French and Dutch, who all began to form trading companies with trading stations round the coasts of India and China. The English, in particular, equipped numerous trading and diplomatic expeditions. In 1604 the East India

Company, known as the Old Company, sent four ships to the Moluccas, where valuable cargoes of spices, pepper, ebony and sandal-wood could be obtained.<sup>1</sup> The Keeling expedition in a voyage from 1606-9 reached Java, where a factory or trading station was established. Japan was visited by an ambassador of James I of England, and tentative efforts were made to open Japanese ports to English ships. Though factories were set up, rivalry between English and Dutch brought about the expulsion of all foreigners from Japan in 1624. Possibly from these early connections with Japan, tea was first heard of in England. The first European known to have mentioned tea is the traveller Pinto, who visited the Far East in the middle of the sixteenth century: but not until the time of the diarist Pepys was it called by the name of 'tay' or tea.

In 1636, the first Englishman to trade with China, Henry Bornford, opened up trading relations at Macao, where there was by that time an important Portuguese settlement. This trade, however, was not carried on directly with the Chinese; it was as much in the interests of the Portuguese as of the English. An attempt, though unsuccessful, was made to establish direct Chinese trade by John Weddell. Further attempts were made in 1643, 1658 and 1664. At last in 1671 an English factory was established at Amoy. The English had been more successful in India, where a factory on the river Hooghly had been opened some years earlier—the nucleus of the first great foothold of the British in India, Bengal. About the same time Fort St. George was built near the site of the present city of Madras; while in 1665 the third position of strategic importance, Bombay, was acquired as the marriage dowry of Catherine of Braganza. In 1684 the Company set up a temporary factory in Canton, and subsequently British trade began. Throughout the first half of the eighteenth century British ships sailed to Chinese ports, but only under sufferance. Despite vigorous efforts to obtain better trade conditions, the English, along with other Europeans, were confined to Canton by an imperial edict of 1757. It was the beginning of a long struggle due very largely to the aloofness of attitude pertaining to the imperial throne of China. In 1792 Lord Macartney was appointed British ambassador to Peking, with the aim of securing the opening to the British of Ningpo, Chusan Islands, Tientsin and a depot at Peking. The failure of the costly embassy is well known; it met with nothing but rebuff. In India, meanwhile, difficulties had arisen not from the

<sup>1</sup> W. J. H. Watkins, Notes on the trade in spices, gums and aromatics, with a map to illustrate the trade in 1584 (*Geog. Teacher*, Vol. XII, 1924, pp. 392-5).

natives but from rival French traders. The English factories were soon opposed by French : on the west was Tellicherry and Mahé and on the east Pondicherry and Fort St. David, while the Portuguese were firmly settled in Goa. The opposition of the French was overcome after the Seven Years' War, and under the guidance of pioneers such as Clive and Warren Hastings permanent trading relations were established. The story of the British in India is one of slow but steady expansion.

Among the other important European nations, who simultaneously with England were bringing Eastern lands into closer touch with the West, the Portuguese were the real pioneers. They were primarily responsible for the opening of the sea route between East and West. Under the influence of Henry the Navigator they began to develop into a seafaring people. During the fifteenth century they ventured south down the West African coast. Gradually they got farther until Vasco da Gama with four vessels rounded the southernmost point of the African Continent. Da Gama was closely followed by Francisco de Almeida, who crushed the Moslem sea power and obtained control of the Indian coast from Diu to Cochin.

Alfonso de Albuquerque superseded de Almeida in 1509 and seized Ormuz, Goa and Malacca. The Portuguese were then masters of the East. A Portuguese, Alvarez, was the first European to reach China by sea. He got as far as an island south of Canton in 1514. Shortly after this, Portuguese ships succeeded in carrying cargoes of pepper to China, but the success was only a temporary one. Buccaneers methods roused dislike on the part of the Chinese, so that Portuguese progress was difficult. About the year 1550, however, a footing was obtained at Macao, but Portugal's Eastern dominance was fated not to endure.

The Spaniards, too, achieved early successes in the field of geographical exploration. Columbus himself undertook his voyages on behalf of Spain, though a native of Genoa. Magellan pointed the way westward to China via Cape Horn in 1520. In 1564 Miguel Lopez de Legazpi set out on a voyage of discovery, secured the Luzon Islands, which he renamed the Philippines after his sovereign and founded Manila. The Spaniards held his strong position until 1898, when the islands were lost to the United States. In the early seventeenth century Spain, having been admitted to Formosa, began to trade with Japan, until the opposition of Holland proved too strong. Nevertheless, successful trade was maintained along the coast of China.

The rise of the Dutch as a maritime people came with the religious wars and persecutions of the Protestants at the hands

of the Catholics at the end of the sixteenth century. When the Protestant cause had been championed by the House of Orange, the sea power of the Netherlands made rapid strides. Incurring fierce opposition from Portuguese and Spaniards over questions of trade, the Dutch began to look for markets of their own. Between 1595 and 1597 they reached the Moluccas and Java. By 1619 they had founded Batavia, thus establishing the hold that now has strengthened into the prosperous Netherlands East Indies. Trade was also carried on with China and Japan at the expense of the Spaniards, who were driven out of Formosa by the Dutch in 1642.

As to the French, their chief commercial interest was in India: in China their interest was rather in missions than in commerce. As early as 1604 a chartered company was formed for purposes of Oriental trade. Other companies were formed in 1611, 1642 and 1644, at the instigation of the able Colbert. Stations or factories were set up on the Indian coasts in opposition to those of the British East India Company. French influence in these regions was threatening to override the English, when Clive's timely victories secured the supremacy of the English. For French trade with China the *Compagnie de Chine* was formed in 1698. Much credit is due to the French Roman Catholic missions—Dominican, Franciscan and Jesuit. In 1542 St. Francis Xavier, a Jesuit, reached Goa and began with considerable success to preach the Gospel in Southern India, Ceylon and Malaya. Many others followed. Matteo Ricci, another Jesuit, is worthy of note. He spent years in Nanking, Nanchang, Peking and Tientsin, leaving behind on his death in 1610 a noble tradition of learning. Friction between the different missionary bodies was inevitable and led to the expulsion from China of Christian priests during the eighteenth century.

The relations of the Russians with the East began with the downfall of the Mongols in China. Attempts at diplomatic relations were made many times during the Ming and Manchu dynasties. Ultimately by the Treaty of Nerchinsk (1689) trade, subject to strict regulations, was permitted. In 1727, 200 Russian merchants were to be allowed to visit Peking every two years. The intercourse, which had found its beginnings in the Middle Ages when Southern Russia was an important gateway into Asia, led to the acquisition by Russia of more than half Asia, namely Siberia and the opening of the Trans-Siberian Railway with its terminus at Vladivostok.

The history of later intercourse between Europe and Asia is too long and complicated a narrative for this volume. The

nief stages in the building up of the Indian Empire are well known to all readers of history ; in China it is a story of advance on the face of many obstacles. Europeans have slowly forced their entry into all Chinese ports. To do so the English have fought the Opium and ' Arrow ' Wars and endured the Taiping Rebellion, in addition to becoming involved in China's wars with France and Japan.

The importance of the explorations and discoveries of individual travellers must not be overlooked—the journeys of Ralph Fitch, Thomas Roe, of Laval and Tavernier in the sixteenth and seventeenth centuries, to mention only a few of the earlier travellers ; and the valuable geographical explorations of men like Nordenskiöld, who between 1878 and 1880 sailed round the northern shores of Europe and Asia to the Bering Straits, thus finding the north-east passage. Recent travels by land in Asia are far too numerous even to mention. Men like Sven Hedin, Francis Younghusband, Aurel Stein, Prince Kropotkin, and Ellsworth Huntington have perhaps achieved some of the most extensive investigations throughout Central Asia, so that the Pamirs, Tien Shan, Tibet, Chinese Turkistan and the Gobi Desert are no longer unknown regions to the Western world. Yet that these vast tracts still have secrets to be revealed is shown from such recent discoveries as those of Mr. Roy Chapman Andrews, whose expeditions were arranged under the auspices of the American Museum of Natural History. The expeditions are of great interest, not only from the fact that motor-cars crossed the Gobi Desert, but also because of the fresh light thrown on man's Asiatic ancestors.

Recent European exploration of Asia has travelled along lines which are really the roads of mediaeval times. The opening of the Suez Canal in 1869 brought back some of the importance of the Mediterranean and led to the abandonment, to a great extent, of Vasco da Gama's Cape route. On land the Transiberian Railway, built from 1891-1905, though a long way further north, emphasized the old Transasiatic routes. Later still aerial communication was opened up largely by land through the flights to India of Sir Alan Cobham and Sir Samuel Hoare. Aeroplanes are thus following the old caravan routes in going to Alexandria, Baghdad, Basra and Karachi.

Regular air services are now operated by the British Company, Imperial Airways, from London to India, Malaya and Australia ; by Dutch lines to the Netherlands East Indies ; by French lines to Indo-China ; by Russian lines across Siberia, whilst many hitherto inaccessible parts of China are now accessible by regular services.

## CHAPTER VII

### ASIA'S POSITION IN THE WORLD

**T**HE diversity of character presented by different parts of the Asiatic continent is such as to prevent the whole being considered to any extent as a unit. One might attempt to give an account of the forests of Asia, but little of what one might say about the forests of Siberia would apply to India; one might discuss the wheatlands of Asia, but

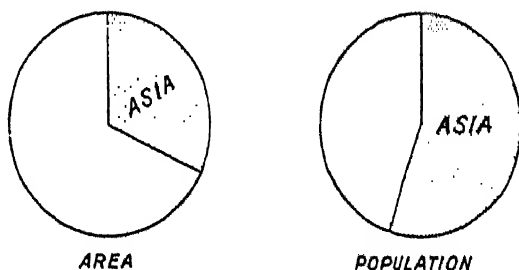


FIG. 25.—The area and population of Asia compared with those of the world as a whole.

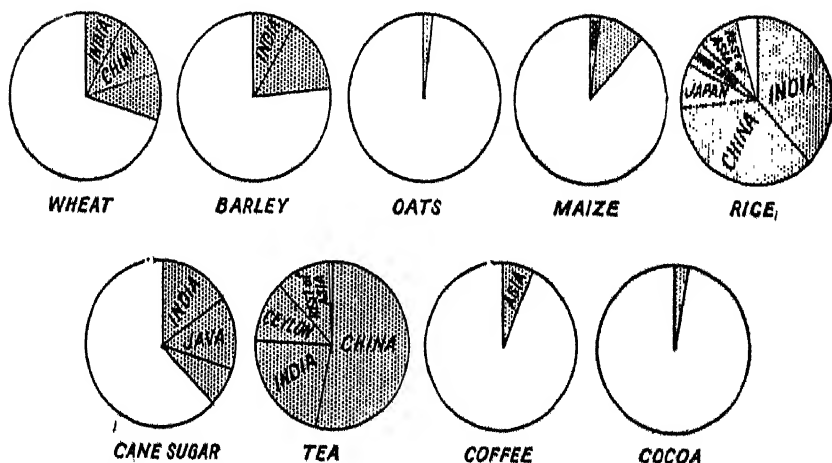


FIG. 26.—The position occupied by Asia in the production of certain staple foodstuffs.

In each case the whole circle represents the total estimated world production for the average of the five years 1923-7, the stippled portion is the total produced in Asia. (Based on figures published by the International Institute of Agriculture.)

he description of conditions in South-western Siberia would be applicable to India; what may be true for China is far from being correct for India; even what is true in Turkey may not

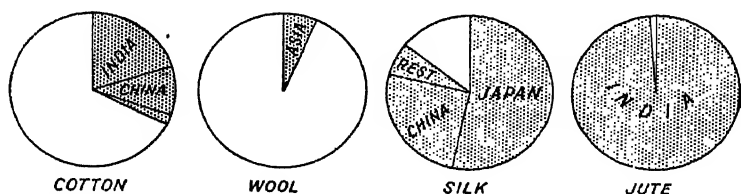


FIG. 27.—The position occupied by Asia in the production of four staple textile materials.

Asia's virtual monopoly in jute and silk is interesting as well as the small production of wool. China is one of the few temperate lands where woollen clothing for winter is not yet in general use.

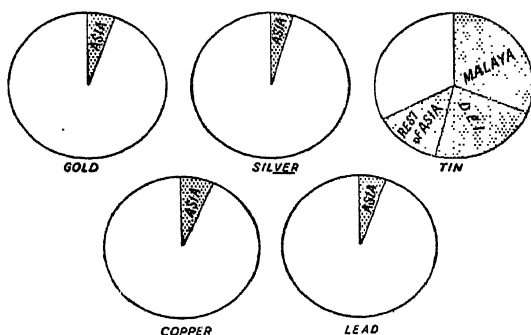


FIG. 28.—The place occupied by Asia in the production of five leading metals.  
The proportion is relatively small except in the case of tin.

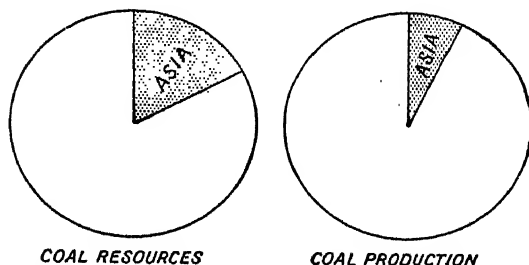


FIG. 29.—The position occupied by Asia in connection with coal.

The small production relative to reserves is in marked contrast to Europe where the present production is very large in comparison with reserves.

apply to Syria. The greater part of this volume is therefore devoted to a regional account of the countries of Asia, and this introductory section dealing with the continent as a whole has

been made as brief as possible, except for the historical chapter which deals with an aspect but slightly considered in the following pages.

For certain purposes, however, it may be useful to realise the position which Asia, as a whole, occupies in the world to-day. Unfortunately complete figures are very rarely available for all Asiatic countries; those for China are almost purely guess-work, whilst it is frequently impossible to separate Asiatic Russia from European Russia. As far as possible diagrams which illustrate this chapter have been drawn up to show Asia's present share in the production and supply of the principal commodities which enter into world commerce.

A survey of the agricultural regions of Asia has been initiated by Dr. S. van Valkenburg in *Economic Geography*, commencing in the issue for July, 1931. He adopts the scheme of climatic regions given in this book and finds the major land-use regions closely coincide. His coloured map presents the following major divisions:

1. Tundra and Alpine.
2. Desert.
3. Forest.
4. Grazing.
5. Crop land--with four divisions: wheat, rice, millet-sorghum, and oats.
6. Plantations.
7. Oases.



## PART II

# THE COUNTRIES OF ASIA

### CHAPTER I

#### TURKEY—THE THRESHOLD OF ASIA

IT is perhaps appropriate that we should commence the study of the countries and regions of Asia with modern Turkey. The Turks are essentially an Asiatic race; the Oriental character of Turkey has long been recognized by its inclusion as one of the countries of the 'Near East'. Yet modern Turkey is becoming modernized and Europeanized under the guidance of Mustapha Kemal Pasha at a rate almost without parallel in the annals of history. Miss Grace Ellison, in a recently published



FIG. 30.—The present extent of Turkey.

ook,<sup>1</sup> has summarized the creed of Kemal Pasha, not inaptly, as 'we will be modern *and* Turkish'.

So important is the new outlook in its influence on the development of Turkey that we will follow the course of briefly recapitulating the main points of Turkish history before proceeding to an account of the geography of the country.

In the latter part of the thirteenth century, the former seljukian dominions in Asia Minor were already broken up into

<sup>1</sup> *Turkey To-day*, 1928.

a number of petty kingdoms and were hard pressed by invading Mongols. The Ottoman Turks at this time were but bands of nomadic horsemen haunting the Anatolian highlands. One day, when riding within sight of Angora, a band of four hundred Oghuz Turks saw on the plain below them a fierce battle in progress and, through their love of a conflict, bore down to assist the losing side—not knowing until afterwards that they had won the day for the Seljuk Sultan of Rûm against the Mongols. The grateful Sultan allowed the Turks, who were led by Ertoghrul, to settle in his dominion. Othman, the son of Ertoghrul, has for long been regarded as the founder of the Turkish Empire, and for more than 600 years his house provided an unbroken succession of sultans. It was from so curious and humble a beginning that the Turkish Empire grew. The



FIG. 31.—The Ottoman Empire, 1566, at the period of its greatest extent.

Turks were victorious against all comers until pitted against the Mongolian hordes under the great Tamerlane at Angora at the beginning of the fifteenth century. But Turkish history throughout emphasizes one thing—the Turk's peculiar genius for reinvigoration. So it was not until after the disastrous meeting with Tamerlane that the Empire reached the height of its power. This was during the reign of Sulciman the Magnificent (1520-1566), when the Turks ruled in undisputed sway from Budapest to Mecca and from Upper Egypt to the Black Sea.

Then followed three hundred years of decline, till the 'Sick Man of Europe' became a byword. Towards the end of last century there arose the 'Young Turk Party', and in 1908 the Young Turks compelled the Sultan to elect a chamber of deputies. Western Europe began to feel that the fortunes of

Turkey had at last changed for the better, but in 1912 came the Balkan War and the further humiliation of Turkey. In 1914, full of hope that at last her opportunity had come, Turkey entered the War as an ally of the Central Powers. But the result was disastrous. The Treaty of Sèvres wrested from her all her Asiatic dominions except Asia Minor. Even there the independent state of Armenia claimed a large share of mountainous country in the east; Greece was allotted an important zone round Smyrna, whilst a neutral zone was determined on either side of the Dardanelles and Bosphorus. In Europe the

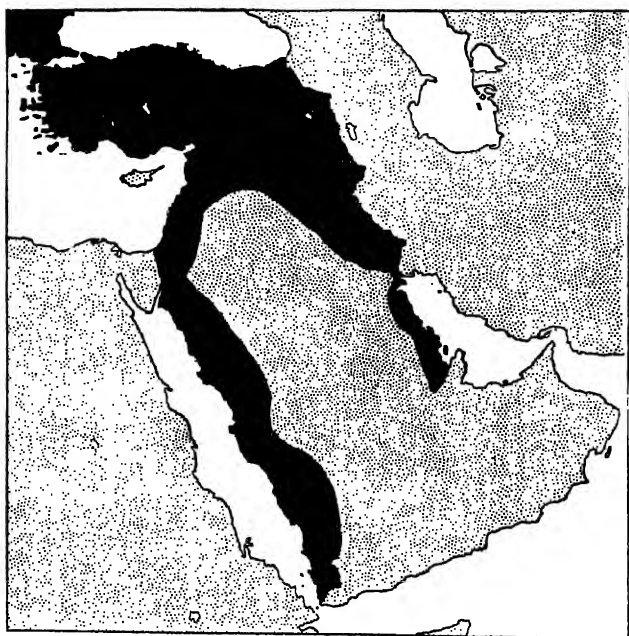


FIG. 32.—The extent of the Ottoman Empire in 1910 prior to the Balkan Wars and the Great War.

boundary of Turkey was fixed within a few miles of the walls of Stamboul.

Then came the Turkish revolution—a nationalist movement headed by Mustapha Kemal Pasha. Acting in complete defiance of the provisions of the Treaty of Sèvres and of the Sublime Porte Government in Constantinople, this 'Napoleon of Modern Turkey' raised an Anatolian army with the avowed object of regaining Smyrna from the Greeks. The Kemalists, as they were called, adopted Angora as their headquarters and set up there a provisional government. On September 17, 1922, the

Kemalists entered Smyrna—only four days later a disastrous fire commenced which destroyed all the foreign quarters of the town and left only the old Turkish section. It was apparent that the real power in Turkey was the Angora Government and not the fragment of the old administration remaining in Constantinople. At Mudania, on the shores of the Sea of Marmara, representatives of Angora met the Allied generals under the chairmanship of General Sir Charles Harrington and drew up the famous Mudania Convention (October 11th, 1922). The Turkish right to Smyrna and the whole of Asia Minor (excepting the neutral zones along the Dardanelles and Bosphorus) was confirmed, and the immediate evacuation of Eastern Thrace (the portion of Europe between the Maritsa River and Constantinople, including Adrianople) by the Greeks was provided for—thus defining, roughly, the present limits of Turkey.

Since then, Kemal Pasha has been engaged in consolidating and building up the new State. The *de facto* Government at Angora assumed the title of the Turkish Grand National Assembly in 1920; on November 1st, 1922, it voted a resolution declaring that the office of Sultan had ceased to exist. At the same time the office of Caliph, or head of the Mahommedan religion, which had always been held by the Sultan, was divested of all temporal power, and it was provided that it should be filled by election from among the princes of the House of Osman. The administration of Constantinople was quietly taken over on November 4th, 1922, and the Sultan himself left the city on November 17th. On October 13th, 1923, Angora was declared to be the capital of Turkey—despite certain difficulties of access which will be noted later, the associations of Angora as the birthplace of the old Empire and the ancestral home of the Turks fit it to be the capital of the new Turkey far more than cosmopolitan Constantinople or mercantile Smyrna. On October 29th, 1923, the Grand National Assembly proclaimed that Turkey (the new official name in place of the Ottoman Empire) was a republic and elected Mustapha Kemal Pasha first President. Although Islam was declared the State religion, the Assembly decided on March 2nd, 1924, to abolish the office of Caliph and the princes of the House of Osman were expelled from Turkey. In April of the same year the religious courts were abolished. In the days of the Ottoman Empire enormous power was exercised by the various religious Orders of Dervishes—whose position may be compared to that of the Monastic Orders in England at the time of their conflict with Henry VIII. It is not surprising, therefore, that the Orders were abolished in September, 1925, the Dervishes driven out of the country

and their 'tekkes', or monasteries, closed. The Ulema, or official priesthood, was suppressed in 1926, and the care of the mosques and the ministrations of Islam passed into the hands of a single Imam for each mosque. The final stage in the State's anti-religious campaign came during the writer's visit to Turkey in the spring of 1928 with the order disestablishing Islam as the State religion. To one who has lived in the East it is indeed strange to go through a country full of mosques, and never to hear the muezzin's call to prayer; never to see the bearded pious bowing down towards Mecca at the hour of sunset.

The orders abolishing the fez and directing the unveiling of women were, in many ways, strokes of administrative genius. There is no doubt that the age-old antagonism between Moslem, Christian and Jew was responsible for the numerous disturbances which made civil administration so difficult. The fez was not a Mahommedan or a Turk uniform, and made it easy to distinguish the hated Christian or Jew. Hence petty personal quarrels often developed into civil brawls. The abolition of the fez and the insistence upon Turkish as the only language rendered much more difficult the development of religious quarrels. One does not now see a single fez; but the unveiling of the women has been more difficult to enforce. To the Western man who is accustomed to think of her sex fighting for liberty and equal rights and to compare with some pride the state of affairs in 1929 with the Victorian era, it is curious to observe the effect in a nation whose women have had liberty thrust upon them. In Constantinople and Angora it is rarely that one sees a fully veiled woman, and the younger generation is going readily enough to the silk stockings and the brightly coloured frocks of the West—but not, curiously enough, to the hat, the place of which is taken by a scarf wound round the head. In the smaller towns and villages there is little tendency yet to escape from the sombre black of the old costume. This consisted of a black skirt, a black cape and a black draped head-dress, the whole not unlike the outdoor dress of an English housewife. From the head-dress a thick black net veil hangs over the face, but can be lifted at will. Though the veil is now seldom worn thrown back over the head, it is usually lowered as a stranger passes.

Turkish has been adopted as the one and only language, the signs of Greek and Roman lettering were obliterated, and even the names of stations were written only in the difficult Turkish script. That this was a mistake and militated against the Westernization of Turkey soon became apparent. In 1928

came the resolution to adopt the Roman alphabet in all official documents, and Kemal Pasha has been most active in insisting on all Turkey learning the new alphabet.<sup>1</sup>

Such radical changes in the life of a nation have not been made and cannot be maintained without recourse to forceful persuasion. The power behind Kemal Pasha's government is apparent to the public eye in the Army—which is everywhere—and the Police Force. The latter, with their smart dark grey uniforms with red facings, is probably one of the most efficient in the world, and at present keeps an exact record of the movements of every one in Turkey, Turk and stranger alike—a permit being necessary for all journeys.

We have entered somewhat fully into the present state of Turkey for two reasons. It will be apparent at once that all pre-war descriptions of the country are now absolutely and entirely false and few modern accounts exist.<sup>2</sup> In the second place it is essential to realize that the Turkish Republic under the Presidency of Mustapha Kemal Pasha is fundamentally different from the Ottoman Empire which it has replaced. The Sultan was not only head of the Empire, but, in his capacity as Caliph, was the leader of Moslems the world over. In other words, he was intimately concerned, not only with the wide Turkish dominions, but with such predominantly Mahommedan countries as Egypt, Persia, Afghanistan and large parts of India. The force which might have built up a nation was dissipated by the very breadth of its international interests. The President of the Turkish Republic, on the other hand, is devoted to the task of consolidating a nation, one in race and language, and of administering a single country. The change is symbolized by the change of capital from the cosmopolitan port of Constantinople to Angora (now Ankara), the natural, geographical centre of the present Turkish domains and the ancestral home, not of the Moslem religion, but of the Turkish people.

We turn now to consider the geography of the country which Kemal Pasha, now styled Kemal Ataturk—like Alexander the Great, a Macedonian—has set himself to modernize.

The modern Republic of Turkey has an area of about 295,000 square miles, with a population, according to the Census of October 28th, 1927, of only 13,650,000. The Republic includes a small tract of European territory, including

<sup>1</sup> Hence there are now official spellings of all place names in Latin characters, as given below.

<sup>2</sup> Two or three books have appeared since these words were written: *Im Nieuwen Anatolien*, von R. Hartmann; *Turkey To-day*, by Miss Grace Ellison; *Beyond the Bosphorus*, by Lady Dorothy Mills; *The Eastern Mediterranean*, by Colonel P. H. H. Massy.

Constantinople, extending as far west as Adrianople and the Maritsa River. The population of the European portion is 200,000; leaving 12,450,000 as the population of Asiatic Turkey. Asiatic Turkey embraces the whole of Asia Minor, including most of the great mountainous mass of Armenia, but excludes the islands in the Aegean except Imbros, Tenedos and Rabbit Islands, which remain Turkish. The zones adjoining the straits and Bosphorus are permanently demilitarized. We shall deal in this account with the Asiatic portion of Turkey, now the bulk of the republic—only.

**Physical Features.** Asia Minor has been likened to a hollow-bottomed, narrow-brimmed hat with very ragged edges. The analogy is not a good one, but it serves to emphasize one main point. Asia Minor is essentially a plateau with a slight tendency to slope towards a hollow in the centre wherein lies the great

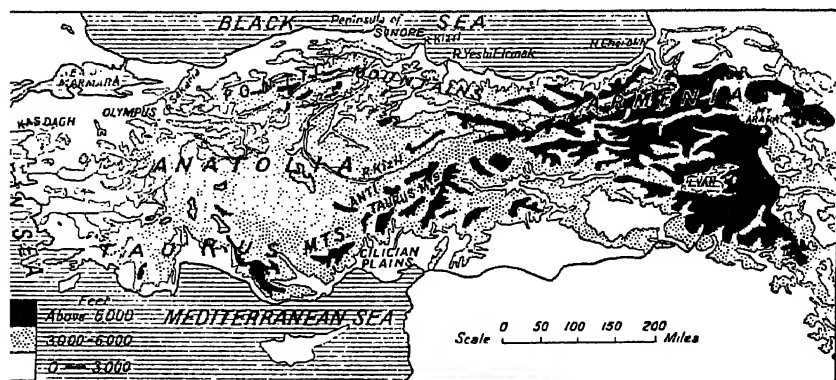


FIG. 33.—Physical map of Turkey in Asia.

shallow salt lake of Tüz Göl. The surface of the plateau has an average elevation of about 2,500 feet; apart from the hollow in the centre there is a general tendency to rise eastwards towards the Armenian massif.

The plateau is not bounded by a simple rim. On the north the Pontic Mountains consist of a succession of ranges placed in *echelon*, with a general east-west trend, separated by deep valleys. Thus from the plateau one climbs the innermost rim and then descends to the coast by a succession of deeply hollowed steps. The discontinuity of the individual ranges is a feature which must be insisted upon. Most of the rivers of the Black Sea coast rise on the surface of the plateau and break through the confining mountains at intervals, having long intermediate courses, parallel to the coast, in the inter-range valleys. Along the greater part of the Black Sea coast the mountains

descend right to the shore. The ranges are parallel to the coast, and there are few harbours. The few tracts of cultivable flat land which do exist are the gifts of the larger streams—the Bafra Plains of the Kizil River and the Charshembé Plains of the Kalkid River. Here, where ports are still more needed, the sediment brought down by the rivers results in the general shallowing of the sea near the coast. The mountains of the northern rim rise in places to 8,000 and even 9,000 feet, but the terraced drop to the sea robs them of any marked grandeur of scenery.

The southern rim of the plateau is formed by the Taurus—narrower and less complex than the northern rim, but grander and more imposing. Again it is built up of short echeloned ranges which in the west reach heights of 10,000 and even 11,000 feet and drop almost sheer to the Mediterranean. Cruising along the coast, the snow-capped heights of the Taurus present a picture not easily forgotten, with the wonderful blue of the Mediterranean in the foreground, an occasional dot which denotes a village near the shore and the darkly forested slopes beyond. There is not the same series of parallel valleys as along the Black Sea coast, and the streams find their way more directly to the sea. Again a coastal plain is absent, the only considerable plains are between Adalia and Alaya and the very important Cilician Plains bordering the north-east corner of the Mediterranean. Leading from the Cilician Plains to the surface of the plateau is the famous pass known as the Cilician Gates, now followed by a motor road. Near by the ‘Baghdad Railway’ cuts through the chain.

Towards the east the Taurus takes on a general north-easterly trend, and becomes reinforced on the north by the parallel chain of the Anti-Taurus. This trend brings it gradually towards the Pontic Mountains, and the fusion of the two results in the great complex of mountains which occupies the east of Turkey. This complex is conveniently termed the Armenian Knot, and culminates in the lofty peak of Ararat. Many other peaks of the massif are volcanic, and activity in the not very distant past is indicated by the presence of hot springs, geysers and frequent earthquakes. Few parts of the Armenian crown drop below 5,000 feet. The level of the great lake of Van is 5,300 feet; the surface of the Erzerum Plain is about the same. The deep lake of Van owes its origin to a lava stream blocking a valley, and for many years has been increasing in depth and area, overwhelming rich fertile land to the north-east. It is among the high Alpine valleys that the headwaters of the great Mesopotamian rivers take their rise.



Returning now to the western end of Asia Minor, the mountain ranges do not there fuse as they do towards the east, but break out into the Ægean Sea as bold fingers of land separating deep inlets. Between the ranges the rivers descending from the plateau have built up broad deltaic plains, and much of the best and most fertile land of Turkey lies in these valleys. The numerous hill-screened inlets afford excellent harbours;



FIG. 34.—The West Coast valleys of Turkey and the Smyrna hinterland.  
Land over 1000 feet stippled.

river valleys themselves ready (though not exactly easy) access to the plateau. The discontinuous nature of the ranges which make up both the Pontic and Taurus Mountains is well shown by their westward prolongations. In addition to the main spurs there are numerous subsidiary ranges, but all have a general east to west alignment. There are four main spurs from the Pontic Mountains.

a) One extends to Scutari opposite Constantinople.

- (b) A second extends to the promontory in the Sea of Marmara south of Constantinople and is continued in the peninsula of Cyzicus.
- (c) A minor one extends along the southern shore of the Sea of Marmara.
- (d) A fourth gives rise to the glorious height of Olympus, overlooking the fertile plain of Brusa and is continued much further west as Mount Ida (Kas Dag) overlooking the plains of Troy.

Southwards other spurs from the plateau separate the great valleys of the west coast—valleys all familiar from their associations in Greek history. From north to south the important valleys are :

- (1) The valley of the Caicus with Bergama (Pergamus).
- (2) The valley of the Hermus (Gadiz) with Manisa (Magnesia ad Sepylum), Ak-hissar (Thyateira), Sardis and Ala-Shehr (Philadelphia).
- (3) The riverless valley which contains Izmir (Smyrna).
- (4) The valley of the Cayster with Ayasuluk and the magnificent ruins of Ephesus.
- (5) The valley of the Meander (Menderes) with Miletus, Magnesia ad Maeandrum, Aidin (Tralles), Priene, Colossae, Laodicea, and Hierapolis.

South of the Meander and the site of Miletus, we come to the great spurs of the Taurus Mountains. Here is included much fertile land, at present undeveloped, in the old land of Caria.

Most of the river valleys already mentioned afford route-ways on to the plateau. The valleys of the Gadiz and Menderes are both utilized by railways, but only that up the Gadiz penetrates to the surface of the plateau, joining the plateau lines at Afyon Karahisar.

Returning now to the surface of the Anatolian Plateau, large stretches are flat or gently undulating steppe-land, over much of which the scenery is dreary in the extreme. Snow-covered and wind-swept in winter, dry and brown in summer, interrupted by broad marshy stretches and salt-pans, the region has a character essentially Asiatic. The surface is interrupted by numerous ranges rising a few hundred or thousand feet from the surface, nearly all again with the general east-west trend. The main water parting of the plateau is towards the centre, but there is little to mark its position.

**Geology.**<sup>1</sup> It is impossible here even to summarize the geology of the Anatolian Plateau except to remark that the whole

<sup>1</sup> See A. Philippson, 'Klein Asien,' *Handbuch der verg. Geologie*, Vol. V., Part 2, n.d., c. 1919. This work includes a map of mineral occurrences.

Asia Minor lies in the main geosynclinal area of Alpine folding. Much of the heart of the plateau is covered with late Tertiary and recent rocks; the hills which appear from beneath this are built up of folded Palæozoic and Mesozoic rocks; there are large stretches of volcanic rock—as around Kayseri, Erzurum, and north of, Angora—as well as extensive masses of granite. In the folded belts which flank Asia Minor to north and south Mesozoic and Tertiary rocks are mainly involved, but there are extensive cores of metamorphic and older sedimentary rocks. In the north-east of Asia Minor younger volcanic rocks cover large areas. The important valleys of the west of the peninsula, Philippon interprets as 'senken'—valleys let down between parallel faults. The connection between the intervening horsts and the mountainous islands of the adjacent Aegean archipelago should be noted.

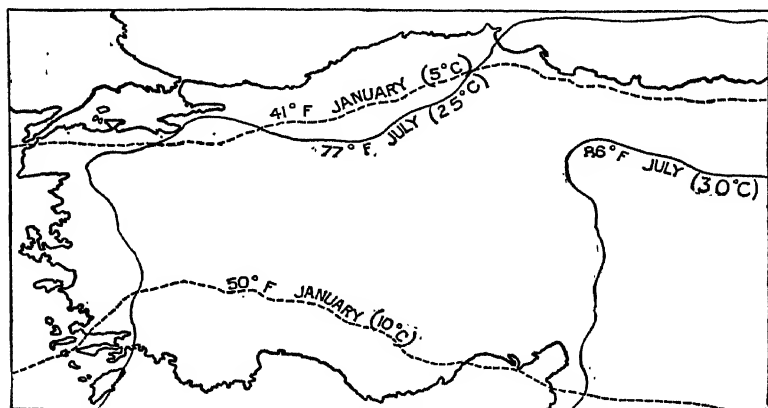


FIG. 35.—The climate of Turkey—January and July isotherms.

**Climate.** Climatically Asia Minor comprises two belts—coastal tracts and the plateau.

The *coastal tracts* have essentially a Mediterranean climate. The Mediterranean coastal strip is the warmest—the annual isotherm  $5^{\circ}$  C. ( $59^{\circ}$  F.) runs east and west roughly along the coast—most of it, except the Cilician Plains, is above  $50^{\circ}$  F. on the average in January and between  $75^{\circ}$  and  $84^{\circ}$  in July. The bays of the Aegean coast have slightly cooler summers (July average generally below  $75^{\circ}$ ) and colder winters (January average between  $40^{\circ}$  F. and  $50^{\circ}$  F.). By this big variation it will be seen that the Aegean shores have a climate of the Eastern Mediterranean type. Sometimes the winds which sweep down from the plateau are bitterly cold (compare the Mistral from the Alps). The rainfall of the south and west coasts is

almost entirely in winter and is slight in amount—not exceeding 30 inches.

Along the southern shores of the Sea of Marmara the winters are distinctly colder—about  $40^{\circ}$  in January.

The Black Sea coast of Asia Minor is in several respects remarkable. It is remarkable, in the first place, for its heavy rainfall, the average exceeding 100 inches per annum in the mountainous east. Autumn and winter are the rainiest seasons, spring the driest. The rainfall decreases towards the west. The climate may be classed as Mediterranean, and Mediterranean vegetation flourishes (including the typical olive), but only as far west as the peninsula of Sinop. Between Sinop and the

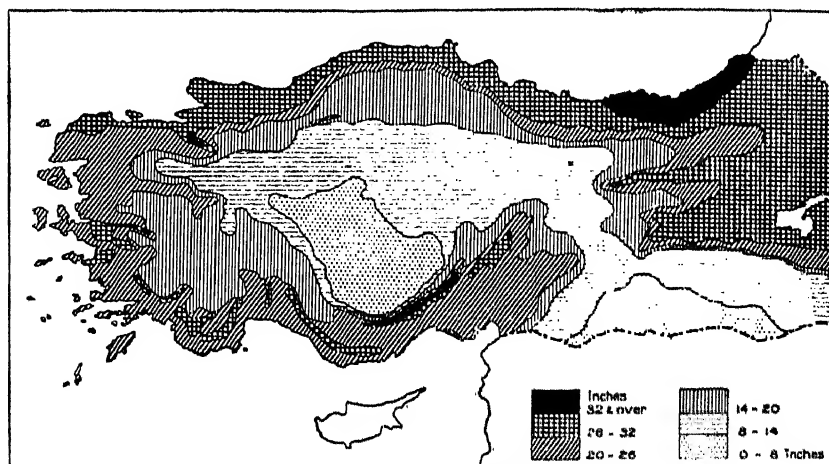


FIG. 36.—The rainfall of Asiatic Turkey.

(After R. Fitzner.)

Bosphorus the vegetation is poorer and the olive is absent. It has been suggested that the Caucasus Mountains, distant as they are, protect the coast east of Sinop from the bitter north-east winds which have their origin in the great high-pressure system of Central Asia. It is possible that these winds, warmed by the descent after crossing the Caucasus, are enabled to pick up much moisture from the Black Sea, hence the heavy autumn and winter rainfall.

On the *plateau* the climate is akin to that of the steppe-lands of Russia, with which the flora and fauna, as well as the human geography, are closely allied. The surface is little protected by the low rim of mountains and is swept by bitter north-east winds in winter and often late into the spring. The mean

inter temperature is not much above freezing-point. Snow as in the valleys continuously for two to four months. The rider has crossed the Anatolian Plateau in early April and even the snow still lying in patches and felt the winter winds still blowing with an icy tang. The summers, on the other hand, are very hot and dry. Even the spring has its unpleasant features, including violent dust storms which drive impalpable dust into everything and obscure the sun for hours like a thick fog. The rainfall régime on the plateau is of the Mediterranean type, but otherwise the climate is that of an arid steppe land. The total precipitation over considerable areas does not exceed 10 inches.

In the mountains of Armenia in the east of the plateau the conditions are still more continental. Erzurum—infamously known as the 'Siberia of Turkey'—has a six months' winter with a temperature below  $15^{\circ}$  F., and the temperature has been known to fall below  $-17^{\circ}$  F. every night for three weeks. Nearly all the valleys and plains in the mountain mass of Armenia are locked with snow for four or five months.

**Vegetation.** From what has been said it will be gathered that there are at least two main vegetation regions:

- (a) The Mediterranean tracts of the coastlands.
- (b) The steppelands of the plateau.

This simple arrangement is profoundly modified by elevation. One may note the vegetation zones distinguished on a valuable and instructive map—old but packed with information remaining true at the present day.<sup>1</sup>

In the *Mediterranean zone* may be distinguished on the slopes of the Taurus (reading downwards)—

Dwarf willow belt, up to 2,800 m. (8,500 feet).

Coniferous Forest (to the tree limit), up to 2,000 m. (6,000 ft.)

Deciduous (summer green) Forest, up to 1,700 m. (5,000 ft.)

Evergreen Mediterranean Woodland, up to 600 m. (1,800 ft.)

It is further noted that in the Taurus region myrtles, oleanders and the typical thorny Mediterranean bushes occur up to 1,800–2,000 feet; Mediterranean pines up to 3,000 feet; the vine and valonia oaks to 4,000 feet; other oaks to 5,000 feet and lars to 6,000 feet.

In the *Pontian zone* may be distinguished—

High pastures.

Deciduous Forest.

Evergreen (Mediterranean) Woodland.

<sup>1</sup> 'Kulturkarte von Kleinasien, nach den authentischsten Quellen entworfen von Amand v. Schweiger-Lerchenfeld,' *Mitt. d. K.K. geogr. Gesellschaft*, 1878, Tafel IV.

On these slopes the box ascends to 1,000 feet; the walnut to 3,000 feet; the rhododendron and azalea to 6,000 feet.

The *Anatolian zone* is essentially a steppeland. Over vast areas it is treeless except for lines of stunted willows along the watercourses. The herbage is often scanty, of grass and small shrubs. In spring millions of tiny yellow and purple crocuses do their best to make splashes of colour amongst the limestone-strewn slopes.

**Production and Industry.** The products of Turkey are naturally very different in the coastal belts and on the plateau, and will be dealt with in the section on natural regions. Agriculture is the principal occupation of the country; for the most part it is very primitive, but more modern methods are being adopted. The principal agricultural products of the *plateau* are mohair, wool, skins and hides; in certain areas large quantities of wheat and other cereals are grown. Opium is an important crop in Konya and Afyon Karahisar. Many of the crops of the *coastal tracts* are curiously localized; tobacco especially round Samsun, Bafra, Carsamba, Sinop, Mebolu, Zonguldak (the alluvial tracts of the north coast), Ismid and Smyrna; olives and olive-oil especially around Aydin in the Menderes Valley and in the Bursa Plains; silk around Bursa; figs, raisins and other dried fruits, nuts and almonds especially in the hinterland of Smyrna; cotton in the Adana or Cilician Plains.

About 17 million acres of the mountainous tracts are under forest, for the most part State-owned.

In 1933 Turkey had 11,000,000 sheep, 10,000,000 goats, 5,000,000 cattle, 1,000,000 asses and mules, and 500,000 horses.

Turkey is richly endowed with *mineral wealth*, but the minerals are at present little worked, largely as a result of lack of communications. This is being remedied, and a rapid increase in mineral production may be expected in the near future. Coal is found especially among the mountains of the northern rim of the plateau, and railways are being built to tap the coalfields, especially between Angora and the port of Ereğli (Heraclea); lignite occurs in several areas. At Arghana Maden, to the south-east of the plateau, the copper-mines are said to be some of the largest and most productive in the world; copper is also known in the Taurus and near Trebizond. Chrome ore is found especially in the west coast tracts—near Bursa, Kütahya (mines on the slopes of Olympus between Bursa and Kütahya yielded 29,000 tons annually for many years) and Smyrna as well as near Adana, Konya and Diyarbakir. There are Government silver mines at Bulgar Maden (near Konya), where gold is also found; silver, lead and zinc occur at Balıkesir. Zinc, manganese, anti-

ony, and mercury are among the other metallic minerals. Iron ores are known in the Menderes Valley and in the Adana region. Amongst non-metallic minerals borax is exported from the Marmara (pandermite or boracite being found 30 miles south of Panderma); emery is obtained in the vilayet of Aydin; pumice at Eskisehir; arsenic in Aydin and Sivas; whilst there are salt works near Smyrna, Erzurum and elsewhere. The working of metals is largely confined to the making of brass and copper household utensils.

*Fisheries* are also of considerable importance.

There are now nearly 1,500 factories employing over 50,000 Turkey—three-quarters established since 1923. A third of the factories are at Istanbul, an eighth at Izmir. There is an important sugar factory at Alpulu in European Turkey, another at Uşak near Izmir and a third at Eskisehir. With the completion of a fourth at Turhal (near Tokat) Turkey should be self-supporting. There are seven woollen factories, but carpets are less important than formerly. A modern cotton-ginning, spinning and cotton oil-cake factory exists at Adana. Flogging is concentrated near Smyrna. In 1934 a five-year industrial development plan was inaugurated by Ghazi Ataturk, with the object of changing Turkey from an agricultural to an agricultural-industrial state. During that year were commenced large state cotton mills at Kayseri and Eregli, a paper mill at Istanbul, a glass factory at Istanbul, a coke and coal productory at Zonguldak, as well as modern installations to deal with sulphur, milk products and otto of roses.

**Population.** For the first time in the history of Turkey a general census was taken in 1927. It showed a total population (including European Turkey) of 6,584,404 men and 65,541 women. The density of population in Asiatic Turkey is thus very low—probably under 40. The population is concentrated in the fertile valleys of the west coast, the cultivable plains of the north and south coasts and the damper regions of the plateau. The capital has a population of 75,000, and it is doubtful whether any town in Asiatic Turkey has a population of 100,000, unless Smyrna (Izmir) has now recovered sufficiently from the great fire of 1922 to exceed that total.

There is a great contrast between the pre-war and post-war constitution of the population of Asia Minor. There were formerly very large numbers of Greeks, especially in Smyrna and the western towns, large numbers of Armenian Christians and numerous Jews and Italians.

After the war a large proportion of the Armenian population migrated to the Republic of Erivan and the Jewish element in

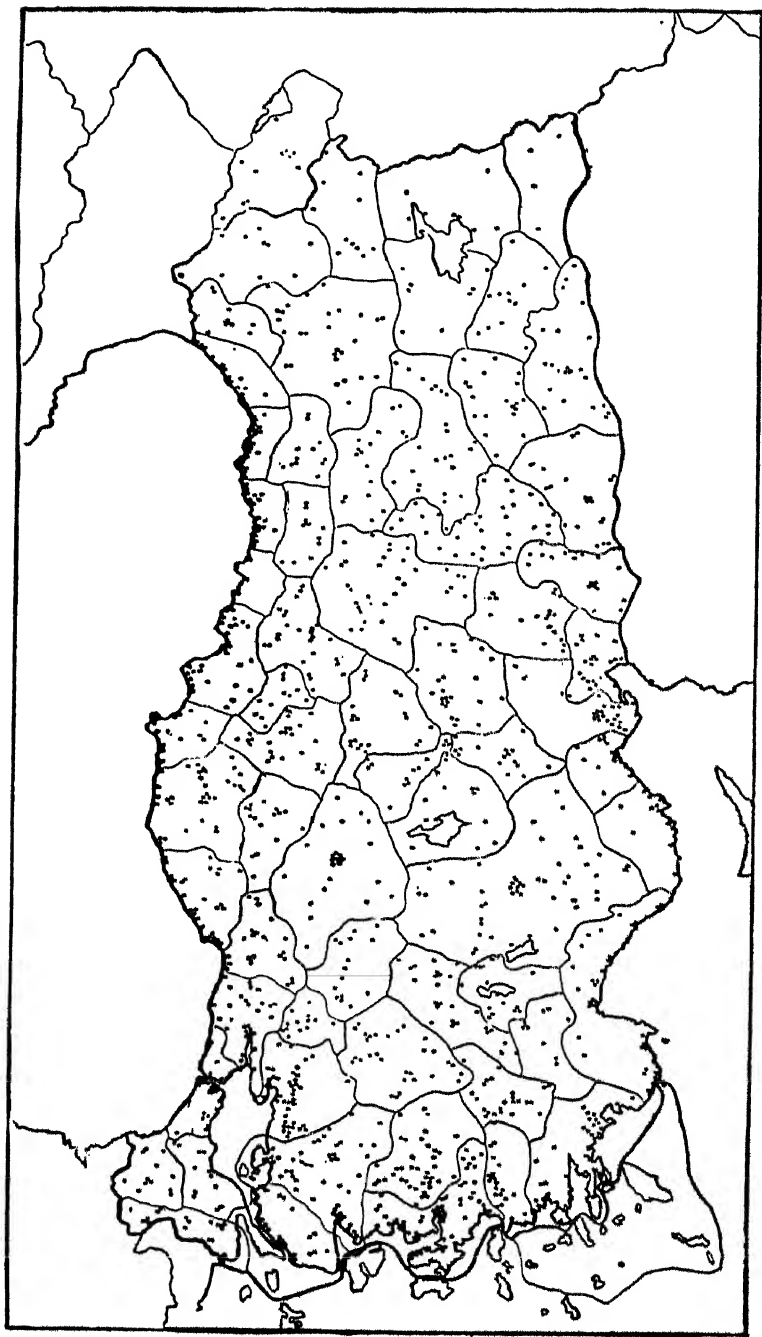


FIG. 37.—The population of Turkey, according to the Census of October, 1927.

Each dot represents 10,000 persons. The boundaries shown are those between vilayets. The placing of the dots was determined after a study of any detailed maps available. Where a vilayet includes a town of whose population an estimate was available, that estimate was subtracted from the total population of the vilayet before spacing the dots in the remainder of the area.



the towns decreased. But far more marked is the disappearance of the Greeks. An agreement between Turkey and Greece, signed at Lausanne, provided for the compulsory exchange of the Greeks of Turkey, not including Constantinople, against the Turks of Greece, not including Western Thrace, as from May, 1923. From the point of view of numbers there is no doubt Turkey was the loser. The hellenization of Asia Minor dates back to the days of classical Greece, and many of the towns, especially in the south-west of Asia Minor, were Greek rather than Turkish in that the wealthy influential merchant and manufacturing classes were Greek. In purging their country of this foreign element the Turks were thorough. All the rayahs (Greek Christian peasants of Turkish nationality) were included

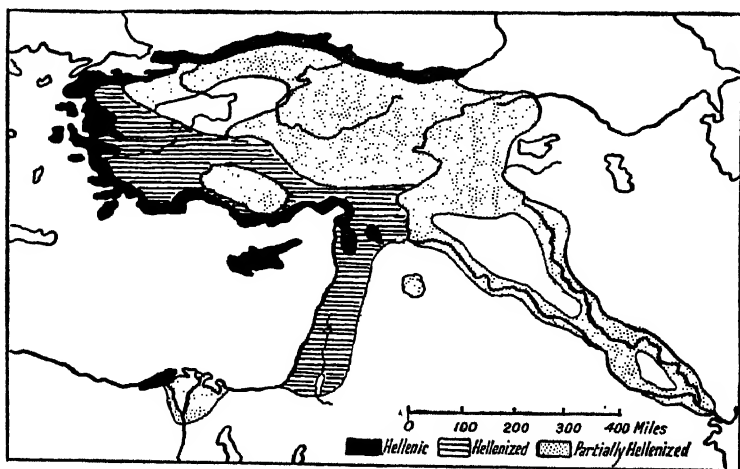


FIG. 38.—Hellenism in Asia about 150 B.C.

(After Myers.)

the banished. It is difficult to estimate the numerical loss to Turkey; the effects are more apparent in the growth of many Greek towns. Although Constantinople was excluded from the exchange, many of the Greeks left the city. The Greek government estimates the number of Greek refugees from Asia Minor, Constantinople and Thrace between August, 1922, and January, 1925, at 1,400,000—10 per cent. of the present total population of the whole great Republic of Turkey. Athens alone increased in population from 300,000 in 1921 to over 500,000 in 1928. It is only possible barely to indicate some of the effects of this wholesale movement of the population. The Greeks took with them their trades. The Turkey carpets which they formerly manufactured in Smyrna they now manu-

facture in Greece. Their departure disorganized the whole economic fabric of such Turkish towns as Smyrna and Aydin, and flourishing industries were entirely destroyed. In the words of Colonel Cornwall: 'She has driven out the real wealth of the country, the intelligent, industrious and thrifty Christian inhabitants. . . . It was they who packed the figs, wove the carpets, tanned the leather, and dug the minerals which formed the staple articles of Anatolia's export trade.' From the Turkish point of view it is a very serious loss to the country. On the other hand, the consolidation of Turkey for the Turks would have been impossible with the Greek octopus still present. It remains to be seen whether the Turks alone can organize and rebuild their industries and trade. The loss is very serious in another way. Turkey is very underpopulated, and it is doubtful whether the country can stand the intensive development programme now in hand.<sup>1</sup>

Here a few remarks on the financial position of Turkey are not out of place. The 1934-35 budget estimates balance at £T184,000,000 (about £22,000,000), representing an income of £2 sterling per head of population in a country consisting largely of peasants. Compare this with about 10s. per head in British India; 12s. in a rich province such as Burma. It is about the same as in the very much smaller and more developed country of Palestine. The revenue is derived from land, property, income tax, customs, consumption taxes (such as 10 per cent. on meals taken in restaurants), sheep and cattle tax and monopolies. The principal Government monopolies include tobacco, sugar, alcohol, matches, salt, petroleum, explosives and cartridges. A third of the total income is swallowed up in National Defence and Police; about a tenth is devoted to public works.

**Communications.** Foremost amongst the needs of modern Turkey are more railways and roads. It is a vast country, and the only means of developing its resources is by improving communications, especially railways. In January, 1929, Turkey had nearly 3,000 miles of railway in operation, rather less than half Company-owned and rather more than half Government-owned. Four years later, in 1933, the total was over 4,000 miles, and the Government pursued a policy of buying up foreign-owned lines. The existing lines really fall into two groups:

- (a) The Anatolian-Baghdad Railways running right across the plateau from Haydar Pasa (opposite Istanbul)

<sup>1</sup> A graphic picture of the population exchange is given by Colonel J. H. M. Cornwall, 'A Journey in Anatolia,' *Geographical Journal*, Vol. LXIV, 1924, pp. 213-22.

to Konya, Adana and Aleppo and with lines to Ankara and Kayseri.

- (b) The West Coast lines, serving the fertile valleys of the west and of which the formerly British-owned Ottoman (Izmir-Aydin) Railway is the best known.

The famous Simplon-Orient Express (Paris to Constantinople) is now continued to Ankara, and on two days a week via Aleppo or Tripoli in connection with the new 'all-rail route' to Egypt. The lines are nearly all standard gauge (4 ft. 8½ in.).

Fig. 39 shows the lines already in existence and those under construction.

- (1) *Ankara-Kayseri*. This line serves the heart of the plateau, and was opened in 1927.

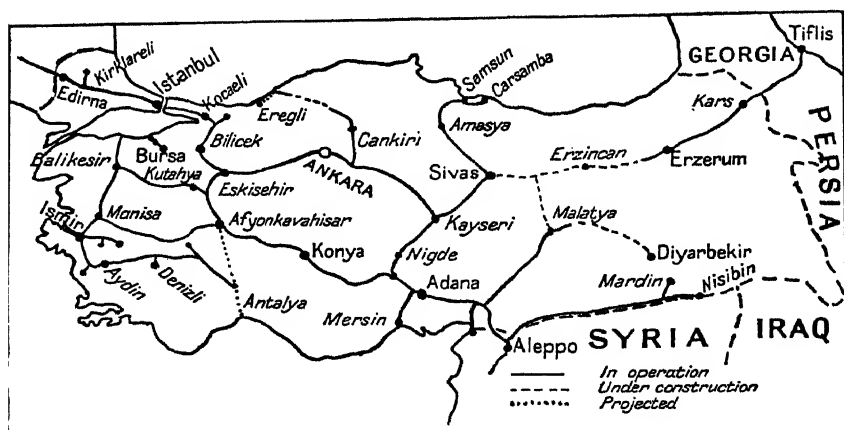


FIG. 39.—Railways in 1932.

- (2) *Samsun-Kavak-Turhal-Sivas-Kayseri*. This line places the eastern half of the plateau in the hinterland of Samsun, where important harbour works are in progress. Samsun is the centre of the most fertile lands of the north coast, and narrow-gauge lines are to tap the tobacco-growing areas of Bafra and Harshembé (Carsamba).

- (3) *Ankara-Zafranboli-Heraclea*. This line will make Heraclea (Eregli) the natural Black Sea port of Angora; the line will open up rich timber areas hitherto inaccessible, and a branch is to be constructed to reach important coal areas. Other extensions are under consideration. Heraclea is to be made a great port.

- (4) *Fejzipasa to Malatya, Argana and Diyarbekir* (metre gauge). Although the Baghdad Railway now runs through to Nisibin and there is a branch to Mardin in South-eastern Turkey,

through running on this line involves passing through Syrian territory via Aleppo, and for 300 miles the line lies on the frontier between Turkey and Syria. The Turks, therefore, aim at a railway further north which will tap the south-east of the plateau and the Taurus, including the rich mines of Argana. The line was partly completed in 1932.

(5) *Ulukisla-Kayseri*. The need for joining Kayseri with the Baghdad Railway was obvious.

(6) *Kütahya-Tavasli-Balikesir*, with a possible extension to Chanak on the Dardanelles (metre gauge). This line opens up an important forest tract and some rich agricultural land of the west coast valleys and affords another link between the railways of the plateau and the west coast.

About £170,000,000 are to be devoted to railway, port, irrigation and drainage schemes during the next five years. It

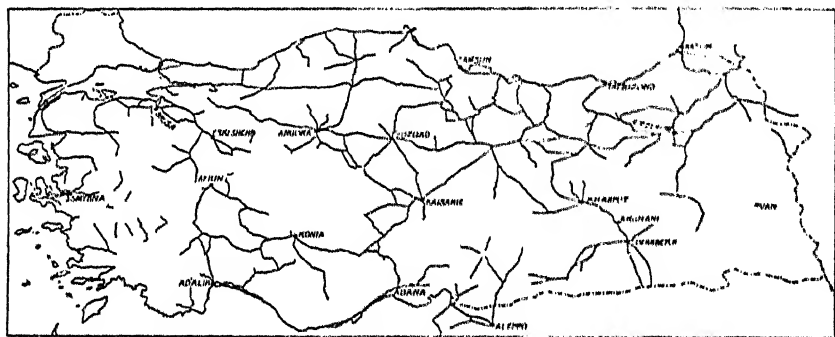


FIG. 40.—The road system of Asiatic Turkey, showing the absence of main trunk roads. The isolation of Smyrna and Bursa is especially noteworthy.

(Based on a map of 1927 officially issued to Turkish police stations.)

will be noticed that Istanbul now occupies an anomalous position. For the new Turkey it is on the wrong side of the Bosphorus, and the Turks have in mind the construction of a great new port on the Asiatic shores—probably near the present railway terminus of Haydar Pasa.

Turkey has about 46,000 miles of road, but it is interesting to note that those roads which are fit for wheeled traffic act definitely as feeders to the railways. Trunk roads are badly needed. Turkey has taken kindly to motor transport. Broadly speaking, where there is a road there is a motor-bus service, at least near the large towns—such as from Bursa to Mudania, and from Erzurum to Trebizond (now Trabzon).

At present Izmir—apart, of course, from Istanbul—is the principal port of Turkey. It is served by a number of regular steamship lines, and in 1932 2,833 vessels, aggregating nearly

300,000 tons, called at the port (Constantinople, 3,400 of 570,000 tons, but including many in transit). From what has been said it is evident that Turkey intends to make Ereğli, İsmir and Trebizond the three great ports of the north coast ; Izmir will remain as the chief outlet of the west coast ; Adalia (Antalya) and Mersin serve the south coast.

**Foreign Trade.** Both exports and imports showed a rapid increase until 1928 and the exports were well maintained during the depression.

XPORTS										1928 - 32															
TOBACCO					FRUITS & VEGETABLES					WOOL & MANS.		COTTON		VEGET. OIL PRODS.		CEREALS		ANIMALS		OTHERS					
10		20		30		40		50		60		70		80		90		100							
COTTON GOODS					IRON & STEEL					COLONIAL GOODS		MACHINERY		WOOLLEN GOODS		MINERAL OILS ETC.		CEREALS		TRANSPORT MATS.		OTHERS			

FIGS. 41-42.—The foreign trade of Turkey.

KPORTS		1928 - 32							
ITALY	GERMANY	U. S. A.	FRANCE	U. K.	GREECE	RUSSIA	EGYPT	SYRIA	OTHERS
10	20	30	40	50	60	70	80	90	100
GERMANY	ITALY	UNITED KINGDOM	FRANCE	RUSSIA	CZECHO-SLOVAKIA	U. S. A.	OTHERS		
IIMPORTS									

FIG. 43.—The direction of the foreign trade of Turkey.

# THE NATURAL REGIONS OF TURKEY

In a paper entitled 'The Regional Geography of Anatolia', G. P. Merriam<sup>1</sup> distinguishes five main regions in Asia  
nor :

(1) a Region of Mediterranean Agriculture, comprising a

<sup>1</sup> *Economic Geography*, Vol. II, 1926, pp. 86-107. By far the most rough study of the regional geography of Turkey (and the lands of old Turkish Empire) has been made by Ewald Banse (*Die Türkei: eine moderne Geographie*, 3rd Ed., Brunswick; Westermann, 1919) which has been briefly summarized in English (with a map) by E. C. Apple (*Geographical Review*, Vol. XI, 1921, pp. 338-50). His 'Inner Anatolia' corresponds to the Eastern Plateau used here; his 'Western Anatolia' exactly to the Smyrna hinterland; his 'Northern Anatolia' the north-eastern coastal strip, Marmara region and northern forest ion; his 'Southern Anatolia' to the southern coastal strips and southern forest region.

narrow strip along the north and south coasts and a broad tract in the west of the peninsula.

- (2) a Region of Pastoral Nomadism, corresponding to the steppelands of the plateau.

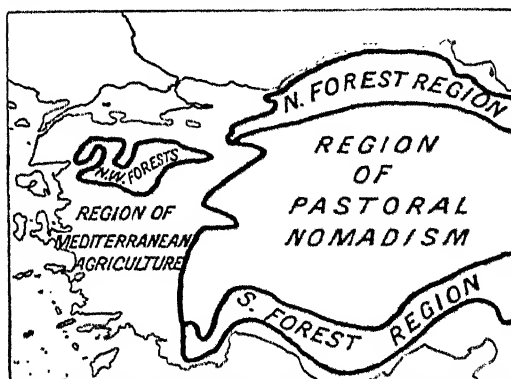


FIG. 44.—Merriam's natural regions of Asia Minor.

- (3-5) three Regions of Forest Exploitation :

- (a) the Northern, corresponding to the forested Pontic ranges ;
- (b) the North-western, a small tract south of the Sea of Marmara ;

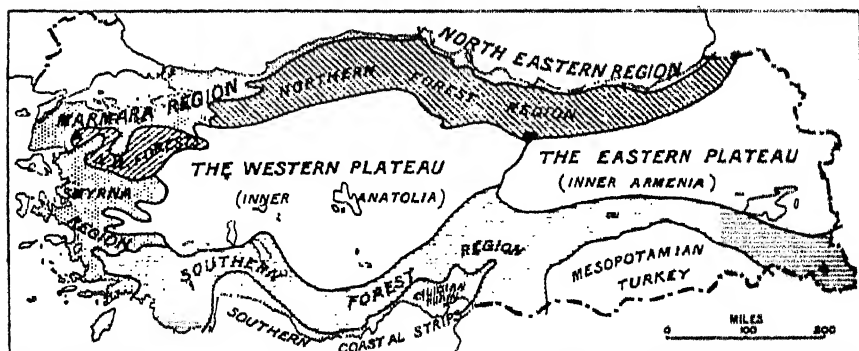


FIG. 45.—The natural regions of Turkey.

- (c) The Southern, corresponding to the forested Taurus ranges.

Fig. 44 is reproduced to show Merriam's divisions. We will take these as a basis but will divide the Mediterranean belt into four parts :

- (a) The north-eastern coastal strip from Sinop to the eastern frontier near Baku.

- (b) The Marmara coastal tract round the Sea of Marmara and including the fertile plains of Bursa and Troy.
  - (c) The Smyrna hinterland or Smyrna economic region.
  - (d) The southern coastal strips, of which the Cilician Plain is the most important part.
- 1 the north-western coastal region the forested hills descend most to the Black Sea, and there is very little coastal strip. The plateau may well be divided into (a) the western steppe-lands and (b) the high valley plains and mountain ranges of the st. Fig. 45 shows the division of Turkey into natural regions on this basis.

### THE REGIONS OF MEDITERRANEAN AGRICULTURE

**The North-eastern Region.**<sup>1</sup> As already noted, the coastal strip from Sinop to the eastern border has a climate which is scarcely typically Mediterranean. The rainfall is heavy and there is no month wholly without rain. As a result such a typical Mediterranean tree as the olive will grow, but the yield of oil is slight and olive cultivation is unimportant. The most important parts of the coast are the alluvial plains of the Halys around Bafra, and of the Yeshil and Kalkid around Carsamba, together with cultivable stretches around Sinop, Samsun, and along the coast at intervals to Trabzon. A crop of special importance is tobacco. Samsun is the most important centre of Asia Minor and the quality of the leaf is excellent. Bafra leaf is famous for its exquisite taste and aromatic quality. The tobacco of Sinop is reported as inferior in quality. Maize is one of the chief grain crops of this region; various Mediterranean crops include, in particular, nuts and myrtles.

**The Marmara Region.** The western prolongations of the Pontian ranges abut on to the charming Sea of Marmara in a series of hilly or mountainous promontories. Between them are broad cultivated valleys. Of the valleys the most important are the Ismid Valley, the Bursa Plains, and the Plains of Troy. The Ismid Valley is another important tobacco region—it is one of the largest producers in Asia Minor, though the quality is not good. The region under consideration is, *par excellence*, the olive-growing region of Asia Minor. The olive grows best on the warm, dry, porous soils of the lower hill-slopes. Between Gemlik and Panderma there is a low hill-range along the shores of the Sea of Marmara, very largely covered with olive groves—400,000 trees are said to be in full bearing. In the Plain of Bursa, the

<sup>1</sup> See E. Nowack, 'Journeys in Northern Anatolia,' *Geographical Review*, January, 1931.

olive is a very important crop ; in the Plain of Troy and about Edremid it is the chief crop. Although the olive does not enter to any extent in foreign commerce, it plays a very important part in the domestic economy of the Turks, just as it does in nearly all Mediterranean lands, as a substitute for the butter and animal fats of other lands. Out of an estimated total production of 150,000 to 450,000 tons of olives, the Marmara Region contributes a large share.

Of the towns in this region special mention must be made of the delightful old Turkish town of Bursa on the slopes of snowy Olympus. A metre-gauge railway and a good motor road across the fertile plain connect Bursa with its port Mudania, four or five hours by the daily steamer from Constantinople. Panderma is the port and railhead further west ; Chanak on the Dardanelles is the chief town of the Plains of Troy. Ismid, the tobacco centre, at the head of the Gulf of Ismid, should be noted. The little islands in the Gulf are summer resorts for the inhabitants of Constantinople.

**The Izmir Economic Zone.**<sup>1</sup> The hinterland of the port of Smyrna may be regarded as extending roughly from the edge of the plateau—actually including certain border tracts on the plateau—to the Aegean and from latitude 39° 40' north to the shores of the Mediterranean. It thus comprises the rich valleys of the Caicus, Hermus, Cayster, Meander and Indos. This may be described as the richest and therefore the most important region of Turkey ; it was the old Hellenized region of Asia Minor, but the inhabitants are now almost exclusively Turks. Apart from the settled Turks of the town, special interest attaches to the 'yuruks'—nomads or semi-nomads who shift their quarters according to season and are occupied in gathering wood, making charcoal and collecting honey.

Agriculture is the chief occupation of the region ; taking first the field crops, cereals occupy the leading position. The largest crop is wheat, followed by barley. Tobacco is grown especially between Izmir and the Meander, hemp in the Meander Plain, sugar beet has been introduced near Uşak and tea at Chesme.

As in all parts of Turkey, agriculture is still carried on in a very primitive way. The cattle-drawn wooden plough is

<sup>1</sup> Under the title of a *General Report on the Smyrna Economic Zone*, a very valuable work of reference was prepared in the later months of 1927 by H. L. Rabino, H.M. Consul-General at Smyrna. The writer is much indebted to the authorities of the Department of Overseas Trade for access to the unfinished typescript. Most of the details which follow are culled from this report.



dually being replaced by the iron ploughshare. Threshing still done extensively on paved threshing floors by horses and cattle treading out the grain, but the demand for threshing machinery is increasing. The seed is sown on the low ground in November or later, the harvest is in May or June (compare the plateau, where sowing is in September and the harvest in July and August).

The wheat grown on the lowlands is a soft wheat (compare the hard wheat of the plateau) and the yields vary from 15-fold to 30- or 60-fold in the richest coastal districts. Thirty to forty

TABLE SHOWING CHIEF FIELD CROPS, 1926-27.<sup>1</sup>

Crop.	Area sown in Donums of 918 Sq. Metres.	Yield in Metric Tons.
wheat . . . . .	2,173,000	234,000
barley . . . . .	1,842,000	332,000
sesame . . . . .	167,000	36,000
peas . . . . .	168,000	20,000
chickpeas . . . . .	50,000	9,000
lentils . . . . .	165,000	29,000
blackpeas . . . . .	100,000	5,000
sunflower . . . . .	4,737	122
seed . . . . .	375	—

percent. of the crop is retained where grown for seed and for local milling, but the Smyrna Region as a whole is roughly self-supporting in the matter of grain. A little rice is grown, but nearly all the requirements of this popular food grain are imported.<sup>2</sup>

Special interest attaches to the cultivation of *opium*.<sup>3</sup> Half the area under opium is in the Smyrna vilayet itself, the remainder in the vilayets of Mughla and Denizli. Before the devastation of the Afyon Karahisar and Smyrna districts during the Turkish War of 1919-22 over a quarter of a million acres were covered with poppy, yielding on an average 5,000 to 6,000 cases of opium—in one year production reached 10,000 cases. The present average crop is estimated at 3,500 cases,<sup>4</sup> valued at

<sup>1</sup> As these details were taken from Rabino's unpublished work, it is not possible to get later figures. Recently the cultivation of sugar beet has increased enormously, reaching about 500,000 tons in 1933.

<sup>2</sup> A typical national dish is 'pillaf', consisting of rice cooked (as in India) with each grain separate, and garnished with sultanas, chopped meat and vegetables (cf. Indian pillau).

<sup>3</sup> These details are all from Consul Rabino's report.

<sup>4</sup> A case is of 50 okes, or 50 × 1.282 kg., or about 141 lb.

£16,000,000 or £640,000 sterling. Smyrna opium is in great demand because of its high content of morphine. Turkish opium contains between 11 and 14 per cent. against Persian (8-10), Egyptian (6-8.5), Indian (6-7), Chinese (3-6). The cultivation is mainly in the hands of peasant proprietors, who thoroughly pulverize the soil by double ploughing and sow thrice at intervals to ensure against failure and to afford a succession of plants. Light, rich soil is desirable. The plants flower from the end of April (lowlands) to June (uplands), and at this time gentle showers are beneficial. The juice is collected by making an incision in the capsule by drawing a knife two-thirds of the way round it, care being taken not to penetrate the interior lest the juice should flow inside and be lost. The operation is usually carried out after the heat of the day and the exuded juice is later scraped off. The average yield is 7 lb. of opium and 600 lb. of seeds per acre. The seeds yield about 40 per cent. of oil, which is used for food. It is as sweet as olive-oil and cheaper. The value of the oil produced is about two-thirds that of the opium. The oilcake is used for cattle food and manure. The opium exported from Smyrna goes mainly to Switzerland, Germany, Japan (when importing), France, the United States, and United Kingdom.

*Tobacco* is an important crop in the neighbourhood of Smyrna, the Smyrna tobacco having a particularly fine taste and being very desirable for blending.

*Cotton* is not such an important crop as in the great cotton belt of the Cilician Plains, but is extensively grown in the plains of the Hermus and Meander Rivers, the finest being from around Aydin. Most of the cotton is of the short stapled 'Jerly', probably a native of Syria, but about 10 per cent. of the crop is of American cotton. The sowing is in March or April, the picking towards the end of September or in early October. The yield is from 190 to 260 kgs. per donum. From 1923 to 1928 the yield in the Smyrna region has averaged 30,000 bales of 420 lb. (150 okes). The exports in metric tons from Smyrna have been: 1923, 1,560; 1924, 2,035; 1925-29 (average) 2,400; 1930, 4,961; 1931, 2,429; 1932, 1,378. There is a large export of cotton seed.

*Grapes and Sultanias.* Of all types of dried grapes perhaps the sultanias of Turkey are best known. They are produced from a small variety of yellow grape, which for long was cultivated exclusively in the Smyrna Region, though in recent times it has been introduced into Greece, Crete, California, Australia and South Africa. Nearly a million and a half donums are under the vine, mainly in the vilayets of Smyrna and

nesia. The vines are grown from cuttings imported from America—which are disease resisting—or from native cuttings. The vines begin to yield in the fifth year, reach full yield after ten years and go on with full yield for thirty or forty years. One vine may yield as much as 450 lb. of grapes. In November and December the vines are trimmed by removal of weak branches, and in February and March are pruned again and the vineyards ploughed and kept clear of weeds. As the leaves develop, the vines are sprinkled with sulphur or, if the weather wet, sprayed with a solution of copper sulphate. The grapes are harvested in the middle of August. The clusters are cut and dipped into a strong lye of boiling water, potash and kerosene-oil, spread on sheets of cardboard and left exposed to the sun for five or six days until dry. The fruit is then collected in small heaps and the stalks winnowed away. Of recent years there has been much improvement in methods of packing—probably 80 per cent. are now machine packed without hand or foot pressing—it was not so a few years ago. In addition to an export of over 1,000 tons of grapes and a few hundred tons of miscellaneous types of raisins, the export of sultanas from Smyrna has been as follows:

				Metric Tons.	
				Statistics by Société des Quais de Smyrne.	Custom-House Statistics.
1923	.	.	.	39,145	28,860
1924	.	.	.	46,954	36,711
1925	.	.	.	28,763	25,054
1926	.	.	.	34,780	28,854

The United Kingdom, Germany, Netherlands and Italy are the chief purchasers.

Considerable quantities of ordinary grapes are consumed locally or made into pekinez. Mahommedanism forbids the use of wine, hence the manufacture of pekinez by boiling the grape juice, which is then prepared by beating with the open hand into a thick dark liquid like clouded honey.

Figs are indigenous to Asia Minor, and the region under consideration is one of the great areas of supply. Of all dried varieties those grown in the Meander Valley are unrivalled. The orchards stretch from the river banks to the hill-slopes, the best being on the hill-sides. The figs of the Meander Valley are thin-skinned, full of honeyed substance and aromatic in flavour. Figs are grown also very extensively along the banks of the Cayster, but the fruit is inferior to that of the Meander Valley.

The fig trees are grown from cuttings, and begin to yield

in the third or fifth year according to method of planting, but the full crop is only yielded from the tenth year. The most productive age of the trees is from twenty to thirty years; the yield definitely declines when the tree reaches fifty. The average yield of a fig tree in full bearing is 25 okes (about 70 lb.); there are sixteen, twenty or twenty-four trees per donum, giving a yield of 400 to 600 okes of fruit per donum (1-1½ tons per acre). The fruit ripens in August and is allowed to dry on the branches. It is carefully collected, left to dry on strips of canvas, packed into horsehair sacks of about 250 lb. and sent to the packing-houses. The packing-houses are carefully controlled by the Municipality and the Health Department. The fruit is thrown into heaps on the floor, picked over and graded by women, then packed into the trays by men and boys who constantly dip their hands into salt water. In post-war years the crop of table-eating figs has averaged between 20,000 and 30,000 tons, practically the whole being exported. Two-thirds of the export is taken by the United Kingdom and the United States, smaller quantities by France and Germany.

*Olives.* Although olive-culture is relatively less important than in the Marmara Region, the olive is still a staple product round Smyrna. Except in the Aydin district the plantations are near the coast, seldom more than 15 or 20 miles inland. An olive tree in full bearing yields 10 to 12 okes (28 to 35 lb.) of olives, equivalent to 2 or 3 okes (5½ to 7 lb.) of oil. It is curious that the crop alternates, good and bad years succeeding one another. This is shown by the crop in some recent years.

					Olives.	Metric Tons.	Oil.
1923	.	.	.	.	30,000	..	6,000
1924	.	.	.	.	125,000	..	25,000
1925	.	.	.	.	27,500	..	5,500
1926	.	.	.	.	82,500	..	16,500

The olives vary in quality, but are mixed for extraction of oil. The trees are beaten to cause the olives to fall and there is no attempt at careful handling. Green and dry olives are used for food, but up to 95 per cent. of the crop is used for the extraction of oil. There is little or no surplus available for export.

*Rose Industry.* The Bourdoun and Isparta districts have always been famous for attar of roses, but many of the former growers are now in Greece and the industry at present is unable to compete with that of Greece and Bulgaria.

Leaving the purely agricultural products of the Smyrna Region, there is an interesting product of commercial importance which comes from the Mediterranean woodlands of the hills

on the edge of the plateau. This is *valonia*, a name applied to the cup of the acorn of the Valonia oak (*Quercus aegilops*). The oaks grow wild in thick woods at Uşak, sparsely in other districts. The yield of valonia at low altitudes (75 kgs. or 65 lb. per tree) is less than that at high altitudes (200 kgs. or 40 lb. per tree). The trees are beaten with sticks between August and October and the valonia spread out in the sun to dry. The acorns, earth, etc., are then eliminated and the valonia sent to Izmir by rail. Only a little is used locally or in Constantinople; the bulk of the crop (average 1900 to 1914, 60,000 tons) is exported from Izmir. The use of valonia is in tanning; the valonia extract, drummed into hides at the end of the tanning process, is particularly valuable in the preparation of sole leather, for it deposits 'bloom' (ellagic acid) and makes the leather solid and compact. During the War consumers, cut off from Turkish supplies, tried substitutes, but the demand for valonia is now again increasing. In 1928-32 the crop averaged 1,000 tons, of which 13,000 tons were taken annually by local factories which produced the extract 'valex'. The balance was exported, the export being widely distributed amongst the countries of Europe. Since the War the United States has been an important purchaser.

Certain of the regions of forest exploitation lie in the hinterland of Izmir, but we will defer their consideration until a later stage.

Regarding the mining industries of the Smyrna Region, it may be said, as of Asia Minor as a whole, that the region is rich in minerals which remain unexploited because of lack of railways and roads. Chrome is mined at Dagardi and Fetige, also emery, antimony and boracite. During the past twenty years minerals which have been worked in the Smyrna Region include emery, antimony, chrome, silver-lead, cinnabar (for mercury), manganese, lignite, sulphur, alum, arsenic and gold.

Turkey and Greece (the latter from the island of Naxos) have at present a monopoly of the world's emery, and the Turkish mines are the most productive. The production of salt, from the northern shores of the Gulf of Smyrna, is a Government monopoly.

Out of a population of about 2½ millions in the Smyrna Region, at least 37,000 are employed in factory industries. Carpet-making and tanning claim 23,000; other industries include flour-milling, oil-pressing from olives and sesamum, soap-making, textile manufacturing (cotton and wool), and industries connected with the packing of fruit, including the manufacture of boxes. Special interest attaches to the manufacture of

Turkey carpets, an industry which employs over 10,000 in the Izmir area alone. The wool used is all local native, mainly from the plateau. The carpet industry remains a cottage industry, and is centred in Isparta and neighbouring towns with about 4,500 looms (highest grades), Onshak (900 looms), Ghiordes (poorer qualities), Konla (rugs, 800 looms) and Dernidgi (large carpets, 600 looms). In 1909-13 the exports averaged 1,800 tons per annum; the yearly export is now rather over 1,000 tons and the value approaches £200,000. The Turks adduce the following figures to show that the industry recovered from the exodus of the Greek and Armenian population, but in later years there has been a marked decline:

Year.	Looms.	Employees.		Output in Square Pies.
		Turks.	Greeks and Armenians.	
1921	8,290	3,706	20,551	992,680
1924	7,685	21,407	—	918,320
1925	9,405	25,903	—	1,144,760
1926	11,305	30,940	—	1,184,924

Obviously, however, the table is incomplete without the pre-war figures. Turkey carpets are purchased mainly by Great Britain and the United States.

**The Cilician Plain** and the southern coastal strip. The temperature conditions of the Cilician Plain have been likened to those of the Lower Nile Valley. The summer is excessively hot, shade temperatures of over 110° are frequent, and there is comparatively little cooling at night. The summer drought is intense; moisture-laden winds from the sea and coastal swamps make the air humid and extremely oppressive, but do not bring rain. The conditions are eminently suitable for cotton, which is grown mainly without irrigation. The soils include black humic soils, grey limy soils, and reddish soils. The bulk of the cotton grown is the short staple variety known as 'Jerly', though American and Egyptian cottons are likely to increase in importance. The crop is grown on a three-year rotation, grain the first year, cotton or cotton and sesamum the second, fallow the third. The cotton is sown in March or April and harvested in October. Shortness of staple is the chief drawback of the Jerly cotton. The production reached 71,000 bales in 1931, but the lack of labour is a great bar to increased production. In 1926

very up-to-date cotton mill was erected at Adana and the industry is flourishing.

The influence of the higher summer temperatures of the south coast is seen in several ways. The olive is found mainly on the slopes of the hills, up to 2,000 feet; bananas, lemons and oranges are more characteristic than figs.

The important town of Adana is the centre of the Cilician Plains; it is in road communication with the plateau through the Cilician Gates and the railway which follows almost the same route. New railways place it in direct touch with the south-east of the plateau and the mining region of Argana. Mersin is the port of Adana, the railway between Adana and Mersin passing through the historic city of Tarsus, celebrated as the birthplace of St. Paul.

It will be seen that the fertile stretch of coastland around the towns and ports of Antalya and Alaya is quite separated from the Cilician Plains. Antalya has a modern flour mill as well as its macaroni, canning and spirit factories. In the future railway communication is ever established with the plateau, Antalya may become the port of Konya and of the chief wheatlands of the plateau as well as for the produce of the Taurus.

### THE REGIONS OF PASTORAL NOMADISM

**The Western Plateau.**<sup>1</sup> From the point of view of climate and vegetation it has been pointed out that the steppelands of the Anatolian Plateau are akin to the Russian steppes. So, too, is the human geography. Economically the Anatolian steppe has less importance than the coastal regions just considered, but it is the home of the Turkish race and 'dominates the life of all Asia Minor by the quality of the men it produces'. The rigorous climate has produced men of physique, self-reliance and at the same time with a likeable openness of character—the best individual soldier in the world'. The whole region is one of low rainfall, generally less than 14 inches a year, falling mainly in winter. In summer the winds blow inwards to the centre of low pressure, but the land surface is so hot as to increase their moisture-holding capacity. The soils over most of the plateau are poor—shallow, highly alkaline or stony. As is usually the case, rock-weathering proceeds slowly in a country where the rainy season and hot season do not coincide (contrast the thick lateritic soils of monsoon lands), and the little soil which is formed is carried off by sudden, short torrential downpours. Much water as penetrates dissolves some of the mineral matter,

<sup>1</sup> The 'Inner Anatolia' region of Banse.

is drawn to the surface by capillary action and on evaporation deposits a crust of alkaline salts. Where the underlying rocks are impervious there are broad, unhealthy salt marshes, despite the low rainfall.

Stock-raising is the chief occupation of the plateau. Cattle are reared where the richer pastures beside a stream or a lake provide fodder, and oxen are the principal animals used for ploughing in those regions where agriculture is possible. In the marshy regions, the water buffalo is to be seen; on the drier parts of the plateau where the Ford and the railway have not yet penetrated, the camel is the principal beast of burden. But the chief wealth of the region lies in sheep and goats. The sheep yield wool, mutton and milk, and form the chief source of meat for the whole country. Large numbers are annually driven westwards to provide for the needs of Istanbul and Izmir. The wool is used for clothing for local use and provides the raw material for the rug and carpet industries to which reference has already been made. Reference has been made to that delightful national dish 'pillaf'; it is the milk of the Anatolian ewes—less frequently goats, cows and buffaloes—which provides the second great national dish. That is ya-our (or yoghourt) and nearly all the milk is consumed in that form. The milk is heated and poured into small bowls and, as it cools, a spoonful of old ya-our is introduced, causing the milk to set when cold like a blancmange—provided the few black seeds in the middle as a charm against the Evil Eye have not been forgotten. Ya-our is like a solid, sour junket—to the European a sprinkling of sugar and some stewed fruit renders it more palatable—and forms the unvarying food of the Anatolian peasant twice a day.

The goats of Anatolia are the long-haired Angora goats, famous for their long silky mohair. Turkey formerly had a monopoly of mohair, but for several decades the production from the karoos and veld of South Africa has exceeded that of Asia Minor. Mohair is valuable in making hard-wearing plushes. The mohair is clipped off annually and baled before being sent to Istanbul for sale and export. The finest comes from the north-west of Angora. Goats and sheep are often kept—one might say usually—in mixed herds and roam over wide expanses of country. The herd often moves with the wind, showing an almost uncanny knowledge of where the sheltered dips and valleys are to be found. The picturesquely garbed shepherd is the servant of his flock, following them in their wanderings. One windy afternoon the writer wandered with an Anatolian shepherd and his flock which moved on its own about two miles in three hours. Advantage is taken of the mountain



pastures in summer; in winter the flocks are herded in rough mud compounds, the hollow walls of which provide the shepherds' quarters, and are allowed out when the covering of snow permits some pasturing.

Amongst the products of the plateau may be mentioned Gum tragacanth, an exudation from a small spiny bush, *Astragalus*, common west of Konya, and in the Angora, Kayseri and Yozgat districts. Gum mastic is similar, obtained from the mastic tree.

Agriculture in the steppelands is restricted to certain 'rain-fall islands' such as the Kayseri district or where the streams can be used for irrigation. The greatest possibilities for development are offered by the south-west of the plateau, around Konya and Karaman. In a normal year Konya railway station <sup>1</sup> alone handles 15,000 tons of wheat and supplies a considerable proportion of the needs of Istanbul. At Karaman, to the south of Konya, water is brought in a canal from the hills and a big scheme plans to use the waters of the Beyshehr Lake in the Taurus. A detailed account has already been given of the opium poppy cultivation, and perhaps the best of the Turkish opium is that from the plateau near Konya.

The towns of the plateau are of great interest. Apart from the semi-permanent mud villages, the older and larger towns have nearly all taken advantage of positions of strategic importance. The old town of Ankara (Ancyra) occupies an impregnable position on top of a volcanic plug; so also Afyon Karahisar and Amasya, which are situated in gorges. Those on the plains, such as Karaman, were surrounded by a strong wall. The towns of the plateau worthy of note are Eskishehir and Afyon Karahisar, controlling respectively the railways to Constantinople and Smyrna; Konya, the centre of the south-western plains, with Karaman and Eregli; Kayseri and Sivas, the centres of the south-east; Amasya and Tokat of the north-east; Angora, the capital, in the heart of the whole.

**The Eastern Plateau.**<sup>2</sup> Whilst the surface of the western part of the plateau is by no means free from ranges of hills and mountains, these become the dominant feature of the east as one approaches the Armenian Knot. The climate, as already noted, is one of great severity. The human geography, as far as physical controls will allow, is similar to that further west. Erzurum is a centre to be noted; Van lies to the south-east.

<sup>1</sup> Information supplied to the writer by Moukbil Bey, Inspector of the State Railways.

<sup>2</sup> The 'Armenia' major region of Banse, including also part of his northern Mesopotamia.

## THE REGIONS OF FOREST EXPLOITATION

**The Northern Region.**<sup>1</sup> The forests which clothe most of the Pontic Ranges are particularly rich and dense towards the east, where the rainfall is greatest. Oak trees are particularly numerous, together with chestnut, beech, fir, elms, lime and pine. Wood is extracted for construction, shipbuilding and firewood, but vast stretches are untouched owing to communication difficulties. Stretches suitable for agriculture are few; the unhealthy town of Kastamonu lies in one of the east and west valleys, and is so far cut off from the rain-bearing winds that irrigation is necessary and the heat of summer is almost unbearable. It is in this region that the important coalfields are situated. The output from the fields of which Heraclea is the port is now well over 1,000,000 tons (1,200,000 in 1932).

**The North-western Region.** The position of this small tract surrounded by agricultural lands is curious and is due to the rugged nature of the country. Only a small part of the region is exploited—pine wood is cut on the lower slopes in the west, valonia is gathered for export.

**The Southern Region.** This region is economically the most important of the three, largely because of the accessibility of parts and the needs of near-by markets. For convenience in description we may include the whole of South-eastern Turkey in this region—including the rich mining districts of Argana and the important town of Diyarbakir. The south-eastern boundary of Turkey—with Syria—lies along the plains below the forested mountains, and Turkey thus includes a strip of country similar to the north of Syria.

The need of the Cilician Plains for wood has resulted in extensive exploitation in the centre of the range and where the working both of hardwood and softwood species has been actively carried on. Here, as elsewhere, the cover of the lower slopes is sparse and cattle are numerous.

In the extreme west the timber has been extracted for shipbuilding for centuries, and forest products are exported both from Antalya and Smyrna. Some further details of the forest exploitation of South-western Turkey may be useful. We include not only the main forested ranges of the Western Taurus, but the spurs between the great valleys of the south-west and west—in the hinterland of Smyrna. Throughout most of the region the peasants, as usual, are apathetic to forest wealth; they use timber indiscriminately for firewood: the shepherd burns down

<sup>1</sup> See Note 1, page 91.

tracts of valonia woodland to increase the pastoral area. The principal trees of commercial importance are:

*Pines*, yielding timber for export to Egypt and Syria, turpentine and colophon, pitch and tar resin, bark for tanning, and pine kernels. Pine and fir trees constitute 70 per cent. of the wealth of most of the south-western forests.

*Oak*, yielding timber, charcoal, bark for tanning and gall-nuts.

*Plane* and *elm* yield timber, used locally; *cedars* grow out on the mountains near the south coast, and the timber for building and cabinet-making is shipped from Antalya.

*Walnut* and *chestnut* are Mediterranean woods, used, amongst other purposes, for cabinet woods.

A little timber is brought by rail to Smyrna, but the bulk of Smyrna's requirements for building and for packing-cases is obtained from Rumania. Turkey's production is exported from Antalya, Fethia, Yuksekkun and other south-coast ports, and goes mainly to Egypt, Italy and Greece. The export in 1926 was about 25,000 tons of timber and building material. There is no doubt that Turkish forests are capable of great development.

Amongst the miscellaneous forest products, the pre-war crop of gall-nuts (used in the manufacture of ink and dyes) amounted to 500 tons. Incense is obtained in large quantities from the forests of Kenidjegiz, which produce 100 tons a year—exported from Antalya to Egypt and Italy.

#### REFERENCES

In referring to works on Turkey it is essential to remember the changed conditions of recent years, although of course the fundamental facts of geography remain unaltered. In addition to works quoted above, Ellsworth Huntington has some instructive articles on Turkish geography in the Bulletin of the American Geographical Society (1911). The great geographical work of reference is Banse's *Die Türkei*, already quoted.

## CYPRUS

The island of Cyprus is one of the lesser known British possessions. It was ceded to Britain by the Turks in 1878 and was granted the status of a colony in 1925. It has an area of 3,584 square miles and a population of 350,000 (1931). About a fifth of the population is Moslem, but over two-thirds are Greek Orthodox. The languages in common use are a corrupt Greek and Turkish.

The topography of the island is distinctive. All along the north is the Kerynia-Karpass range of hills, with peaks rising to 3,000 feet, and which, structurally, is an offshoot from the

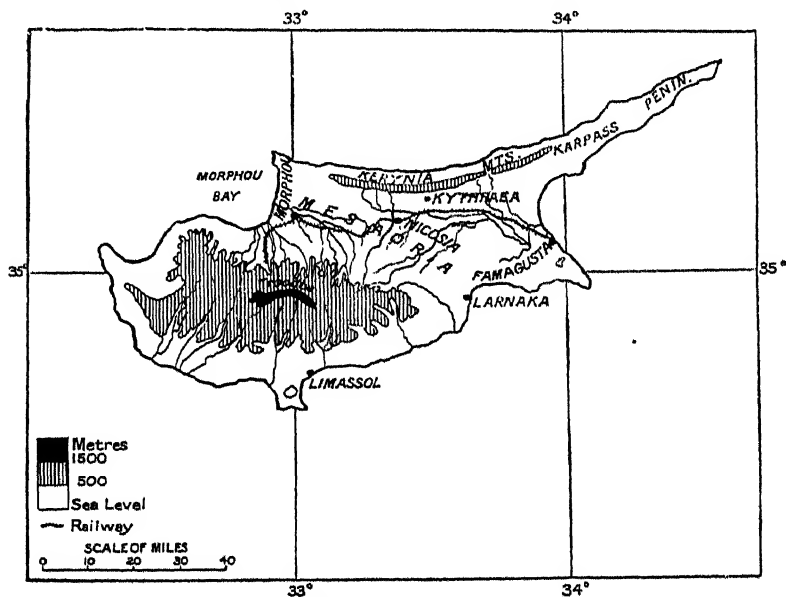


FIG. 46.—Cyprus.

Taurus Range. In the south is the Troödos Range, culminating in a lofty peak 6,406 feet high. Between these two ranges the centre plain of the Mesaoria stretches right across the island from Morpou Bay on the west to Famagusta on the east.

December and January are cold, though snow is rare, and piercingly cold winds may occur in February and early March. For four months, from July to October, the central plain is an arid sun-scorched desert, save where artificial irrigation keeps alive the verdure, with no shelter from the pitiless rays of the sun but an occasional stunted carob tree, and relieved only by the oases of Kythraea, of Kykko and of Nicosia, where there

perennial water and perennial green. Only on the mountain ranges is there any vegetation to be seen, but there the eye rests on pine and plane tree, on green bracken, on wild rose and honey-suckle. The first rains fall in October or November, and a week after their arrival the country is covered with tiny green blades of grass. From November the dull green of the orange groves is relieved by the golden gleam of the ripening fruit. By January the barley and wheat are nearly a foot high and in March the plain is carpeted with wild-flowers, blue, scarlet, yellow and white, in such profusion that it resembles one vast garden. The grain harvest usually begins with the barley at the end of April, followed by the wheat in May. Threshing and winnowing operations are prolonged till August. Beginning with the loquat in May the rest of the year provides a succession of delicious fruits—caishas (the famous Cypriot white apricot), peaches, melons, figs, grapes, pomegranates, oranges, to mention but a few—in rich profusion and endless variety.' (Flinn.)

Space does not permit a further account of this delightful land. One should enlarge upon its strategic importance, its possibilities for further development—which has been slow—but the writer prefers to leave it with the above quotation which pictures it wrapped in just the peaceful beauty which greeted him there one balmy spring day.

So, too, with the Italian island of Rhodes, the glory of whose Saders' Castle shall not be overshadowed by a description of the wonderful grapes of the island or of the holiday of the new Italian seaside resort.

A useful account of Cyprus will be found in W. H. Flinn's *Cyprus, a Brief Survey of its History and Development*, 1924.

Also Luke and Jardine's *Handbook of Cyprus*. Statistics well summarized in the *Statesman's Year-Book*, and there are valuable and full details of production and development in Reports of the Department of Overseas Trade (London: H. M. Stationery Office).

## CHAPTER II

### ARAB ASIA

**A**RAB Asia is a convenient term to include that part of south-western Asia where the Arab race is predominant, and where the common language is Arabic. This includes roughly the whole of the continent lying south of the main mountain belt of Armenia and west of the Zagros. Until the Great War practically the whole of Arab Asia formed part, at least nominally, of the Ottoman Empire. It is now divided between the French mandated territory of Syria, the British mandated territories of Palestine and Transjordan, the Kingdom of 'Iraq, the Arab kingdoms of Arabia and the British sphere of influence extending from Aden.

Apart from the linguistic homogeneity of the area, there are other features from certain aspects which render it convenient to consider the area as a whole. Through Arab Asia lie the routes between Asia and Africa, between Europe and the Far East, and the land routes between Europe and Africa. The vast stretches of desert have resulted in the routes lying in the narrowly circumscribed area of the 'fertile crescent' from the Mediterranean to the head of the Persian Gulf, with the result that the countries controlling this area have had, from time immemorial, a strategic importance out of all proportion to their intrinsic value. This fertile crescent includes within its borders the birthplace and home of some of the earliest civilizations of which history has any records, and has witnessed the rise and fall of the metropolises of at least three mighty empires—Assyria, Sumer and Babylon.

**Physical Features.** Arab Asia is clearly demarcated on the north by the mountainous rim of the plateaus of Asia Minor and Iran—the Taurus and its eastward continuation as the Kurdistan scarp. Except for the narrow isthmus of Suez which separates it from Africa, Arab Asia is defined on all other sides by the sea. The Mediterranean to the north-west, the Red Sea to the south-west, the Arabian Sea to the south-east, the Persian Gulf and the Gulf of Oman to the east.

The dominant orographical feature of the whole area is the

eat plateau of Arabia with its high south-western edge overlooking the Red Sea and its long gentle slope to the north-east towards the plains of Mesopotamia and the depths of the Persian Gulf. At both its eastern and western ends the Arabian plateau is flanked by orographical features of a different character. To the east, occupying Oman, are fold ranges believed to be structurally connected with those of Southern Persia. To the west are the mountain systems of Syria and Palestine, which are sufficiently important to merit careful note. Along the Mediterranean there is locally—especially throughout Palestine—a coastal plain. This is succeeded inland by a belt of upland

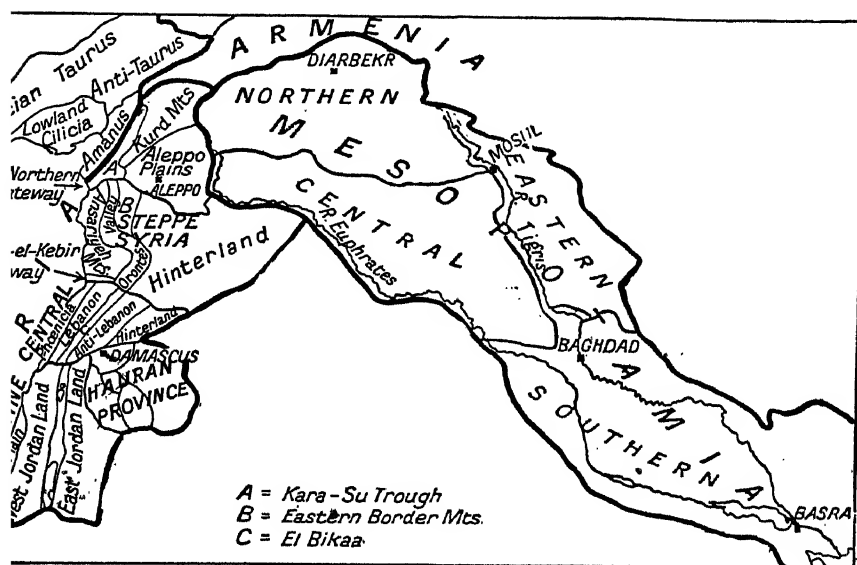


FIG. 47.—Banse's natural regions of Syria and Mesopotamia.

entry running from north to south, forming the range known as the Lebanon in Syria and the hill-country of Western Palestine further south. This is succeeded by a deep trench, also with a north-south trend, occupied by the Orontes in the north and the Jordan with the Dead Sea in the south. This trench is succeeded in turn by another range comprising the Anti-Lebanon of Syria and the hills of Moab or Transjordan further south. On the westward side stretches the plateau. Mention must also be made of the mountain range in the extreme north-west of Syria known as the Amanus, which reaches the coast south of Alexandretta, which is probably an offshoot of the Taurus

Chain and is known as Amanus. This lofty range separates the Plains of Cilicia from Northern Syria.

It is difficult, in South-western Asia, to separate the effects of climate and topography. The even north-easterly slope of the Arabian Plateau, so contrasted with the dissected slope of the Indian Plateau, is the result of the aridity of the climate and the absence of permanent streams. The great barriers of



FIG. 48.—The structural units of South-western Asia.

the region are not mountain chains—excepting of course the bounding heights on the north—but the broad waterless tracts of desert.

The rivers are naturally restricted to the damper fringes. The great twin rivers, the Tigris and Euphrates, the life of 'Iraq, rise amongst the snowy heights of the Armenian Knot. In the west the Orontes and the Jordan are the only two large streams.



**Geology.**<sup>1</sup> In its broad lines the geology of Arab Asia is relatively simple. Excluding Oman,<sup>2</sup> the geology and tectonics which are connected with those of Persia on the opposite side the Persian Gulf, there is, underlying the whole of the peninsula, a great complex of Archean crystalline rocks. These are posed over large areas in Hejaz, along the Red Sea tract and the heart of the continent. Towards the north and north-east—that is, over much of Northern Arabia, the Syrian Desert, Palestine and Syria—great spreads of Cretaceous limestones, slightly folded, hide the underlying Archean. Northwards these give place to Tertiary rocks which persist till the fold ranges the Persian-Turkish border are reached. Over all parts of the plateau there are huge spreads of lava, mainly of Tertiary age. The Mesopotamian lowland is largely alluvial and the delta of the Tigris-Euphrates is spreading rapidly seawards. In the fourth century B.C. the site of Basra was some distance inland from the sea.

**Climate.** The parallel of 34° which passes through the centre of the Eastern Mediterranean passes slightly to the north of Beirut, Damascus and Baghdad. By way of contrast the tropic of Cancer passes across the middle of the Red Sea and through the heart of the Arabian Plateau to Muscat on the coast of Oman. Broadly speaking, therefore, Palestine, Syria and Iraq lie in the continuation of the Mediterranean belt; Arabia is the continuation of the extra-tropical high-pressure belt of the Sahara. In winter the continual cyclones which characterize the westerly wind belt deposit their moisture on Lebanon and the hills of Palestine, or on the second rampart formed by Anti-Lebanon. By the time they have crossed these two ramparts the winds are dry, hence the Syrian Desert and the northern part of the Arabian Desert. Slightly further north the cyclones mark their way along the 'piedmont zone' below the Kurdistan up into the Mesopotamian Plains. The moisture deposited along this zone, together with the water available from the rivers, is sufficient to give rise to the well-known 'fertile crescent' already mentioned. The whole tract is rainless and suffers great extremes of heat in summer.

Arabia owes its rainlessness to its position in the high-pressure belt, and its lofty encircling rim which intercepts any moisture

<sup>1</sup> M. Blanckenhorn, 'Syrien, Arabien und Mesopotamien,' *Handb. d. Geol.*, V Band 4 abt. (Heidelberg, 1914); *Geology of Mesopotamia and its Borderlands* (His Majesty's Stationery Office, c. 1916); E. H. Pascoe, 'Notes on the Oil Fields of Mesopotamia,' *Mem. Geol. Surv. Ind.*, Vol. VIII, 1922. See also later works on Arabia.  
<sup>2</sup> G. M. Lees, *Quart. Jour. Geol. Soc.*, Vol. XXXIV, 1928.

which might reach the interior. In summer, Arabia lies within the world zone of maximum heat; July average temperatures in places certainly exceed 95°. The heat on the coasts of Arabia is often even more trying than in the interior because of the humidity of the air caused by evaporation from the land-locked Red Sea or Persian Gulf. The notoriety of the Red Sea in this respect, a notoriety resulting from the inevitable five days by steamer *en route* for India, leaves one unprepared for the bitter cold which is possible in winter. In Northern Arabia occasional frosts occur in winter; Lebanon and Anti-Lebanon are usually snow-capped, and Jerusalem under a fall of snow is by no means unknown.

**Vegetation.** The natural vegetation of most of South-western Asia is the evergreen Mediterranean woodland, passing gradually into desert as the rainfall decreases. The variations in altitude which characterize many parts of Arab Asia result in corresponding variations in vegetation. Thus bananas and oranges characterize the coasts of Palestine; olive groves and vineyards occur at higher levels; pine forests clothe the higher slopes of Lebanon.

Some further details will be given later of certain deserts of Arabia, which are sometimes referred to as 'tame' deserts by contrast with unmitigated 'true' desert such as the heart of the Tarim Basin. The wide oases which lie in the heart of the tame deserts support large numbers of men and animals, and only a succession of adverse seasons drives them forth to seek sustenance elsewhere.

Considering products common to much of Arab Asia, the fine quality of the wheat and barley of Syria and Mesopotamia is noteworthy. Palestine and Syria, the typical Mediterranean countries, are famous for their oranges, olives, figs and other fruits; silk is important in Syria; cotton in Northern Syria and 'Iraq; whilst dates and coffee are associated with Arabia.

The large Oriental donkey is the commonest beast of burden throughout Arab Asia, and can do much of the work which it is popularly supposed can only be allotted to that ship of the desert, the camel. The famous Arab horses are raised by nomads along the borders of the Syrian Desert and bear witness to the fertility of the 'tame' desert. On the edge of the deserts, in the oases, amongst the mountains and indeed wherever pasturage can be obtained, even if only at certain seasons of the year, cattle, sheep and goats are raised by the nomadic pastoral tribes. The cattle are small; the sheep are commonly of the fat-tailed variety; whilst black goats are the most usual.

**Population.** Although Arabic is the common language of Arab Asia, it is very far from the truth to suppose that the Arab race is the sole race of the region. The geographical position of Palestine, Syria and 'Iraq on the great routeways of the ancient world is, in itself, sufficient to have caused a great diversity of races. Peoples from outside, such as the Egyptians, Greeks and Turks, who from time to time have dominated the lands, have frequently left a permanent impress of their rule.

The *Arabs* are the natives of Arabia, and, bearing in mind the aridity and poverty of their land, they are remarkably numerous. Normally they are organized as small tribes ruled by a chief or sheikh, and it was only in the early days of Islam that they moved as a nation and placed nearly all the lands between India and the Atlantic under their sway. At the present day the Arabs are found all along the southern borders of the Mediterranean and throughout Arabia and Syria. Their language, being the language of the Koran, tends to be coextensive with the Mahommedan religion.

The Arabs fall readily into two classes—the settled, or *Hadarin*, and the nomadic, or *Bedouin*. The settled Arabs include the Syrians, but the Syrians are actually of very mixed blood. They may be defined as including all those peoples, except Jews, who spoke Aramaic at the beginning of the Christian era. They now speak Arabic, and from time to time there have been fresh fusions of Arab blood. Indeed, it is common among higher-class Syrians to claim descent from definite Arab tribes. A large proportion of the Syrians are Christians.

The *Bedouin* Arabs are still almost entirely nomadic, though amongst the northern tribes a few practise agriculture, pitching their long black tents amongst the fields and migrating to mud huts in winter. The pure *Bedouin* Arabs are fine, tall, well-built men with dark skins, dark piercing eyes and black hair. They are brave, hardy and hospitable, but simple in their habits and food. The latter consists chiefly of bread, milk, dates and little goat's flesh.

A few *Turks* are found in Northern Syria and Mesopotamia and the Kurds are closely related to them. *Armenians* are scattered through the cities of Syria as traders, and during the War large numbers came to Mesopotamia as refugees. The *Armenians* are in the main restricted to Palestine and will be considered in detail later. The name *Frank* or *Frangy* has come to be applied to any European—most of the Europeans are but temporary residents, whereas the *Levantine*s are those of mixed European and Eastern blood.

**Communications.** Excluding the northern routes through

Russia, the possible lines of communication between Europe or Egypt on the one hand and India and the Far East on the other, which were available to the ancients, are not numerous. The passage through the complex of mountains of Armenia was extremely difficult, and we may concentrate attention on two groups of routes—(a) the Red Sea Routes, (b) the Persian Gulf Routes.

(a) The Red Sea Routes. Glancing at the map, one would say that one obvious route to India, available to the ancients, was across the narrow Isthmus of Suez and via the Red Sea—exactly the route followed to-day to India via the Suez Canal. Curiously enough, the Suez route was dangerous in ancient times and traffic went up the Nile to Thebes, east across the desert to a port on the lower Red Sea coast. It will be noted that the Suez Route to India is to-day controlled by the nation which commands Suez on the one hand (Egypt) and the nation commanding the southern entrance to the Red Sea on the other. Here Great Britain holds Perim Island in the Straits of Bab-el-Mandeb and the Aden coast; France the opposite coast of Africa.

(b) The Persian Gulf Routes.<sup>1</sup> Because of the mountains on the north and the desert on the south, the routes from the Mediterranean to Mesopotamia and the Persian Gulf had of necessity to pass by the 'Syrian Saddle', otherwise referred to as the 'fertile crescent' or the 'piedmont', since it lies at the foot of the mountains. From the Mediterranean three lines of approach converged on Aleppo:

- (1) From Cilicia across the Bogtche Pass to Sendjeik and Aleppo.
- (2) Alexandretta across the Beilan Pass to Aleppo (Alexander's route after the Battle of Issus in 332 B.C.).
- (3) Mediterranean coast via Orontes Gorge to the plains of Antioch and Aleppo.

From Aleppo the route went across to Zeugma on the Euphrates (from which there was a certain amount of river traffic) and thence to Mosul (Nineveh) and Babylon. Whilst emphasizing the importance of these routes, for the control of which Egypt, Babylon, Assyria, Persia and Greece struggled in the past, one must not ignore the caravan trade across the desert country further south (see page 139 and Fig. 56).

Turning to modern times, we find Britain and France in control of the Red Sea Route; hence the bold bid of Germany for

<sup>1</sup> Reference should be made, for example, to papers such as E. C. Semple, 'The Ancient Piedmont Route of Northern Mesopotamia,' *Geographical Review*, September, 1919.

the control of the Syrian Saddle and the Persian Gulf route. There is no need to retell the well-known story of the 'Berlin-Baghdad' Railway. The actual Baghdad Railway was to run from Konya on the Anatolian Plateau (where it joins the Anatolian Railway from Constantinople) to Baghdad and the Persian Gulf. It threads its way by a series of tunnels and along the sides of a precipitous limestone gorge through the Taurus Range just east of the Cilician Gates, and passes across the rich Cilician Plains through Adana, across the Bogtche Pass of the Amanus to Haleb (Aleppo). From Aleppo it follows the old Syrian Saddle Route to its present terminus at Nisibin, and from a little north of Aleppo to Nisibin forms the boundary between Turkey and Syria. About 150 miles of unsettled tribal country separates Nisibin from the head of the Mesopotamian Railway. Baghdad is linked by rail with its port Basra on the Persian Gulf, but the completing of the remaining link is at present deferred. From Yenidjé in Turkey to Nisibin the railway is run by a French Company. There is a note of tragedy in the unfinished railway—the rolling stock is all marked in indelible letters of cast-iron 'Baghdad'—and the marvellous engineering work of the Taurus tunnels makes one realize the immense amount of energy directed by the Germans towards the completion of the railway.

Aleppo has a broad-gauge railway running to the port of Tripoli; a break of gauge prevents through traffic to the larger port of Beirut which serves Damascus. As will be seen later, Haifa in Palestine is making a bid for some of the Damascus trade as well as that of Palestine at present handled by Jaffa.

The mention of Damascus brings us to the modern land routes from the Mediterranean to Mesopotamia and the Persian Gulf. The Syrian Saddle route is comparatively neglected. It is easily possible for motor-cars, but the local tribesmen are not at present observing a close season for motors.<sup>1</sup> Instead a direct trans-desert route from Damascus to Baghdad by six-wheeler motors is the regular means of communication. The motor conquest of the Syrian Desert is unique in many ways, and the history of the scheme is worth noting. During the War the British Army, forced by military necessity, sent a convoy of lorries from Mesopotamia to Palestine across the desert. Several had to be abandoned, and the experiment was never repeated. After the Armistice several old Army cars were run by natives over the old Saddle Route between Baghdad and Aleppo, following the course of the Euphrates. In the spring of 1923 two young New Zealanders of Scottish extraction—the brothers

<sup>1</sup> The position has recently improved and this route competes with Damascus-Baghdad, which is also threatened by Amman-Baghdad (now improved). Aleppo is an important airport now.

Nairn, one of whom had served with the R.A.S.C. Mechanical Transport in the Palestine Campaign—grasped the possibilities of a desert route to Baghdad which would halve the time required for mails and passengers between Baghdad and London—at that time twenty-four days. In April, with two Buick and two Dodge cars, the desert crossing was made in four days. By the end of October a regular service was inaugurated, and has run almost continuously since. The usual route is from Beirut to Damascus (65 miles), then for 25 miles through the cultivated lands around Damascus, followed by a further 513 miles of desert to Baghdad. The journey can easily be accomplished in twenty-four hours. The desert track is formed solely by the wheels of preceding cars. There is little soft sand, the surface is hard

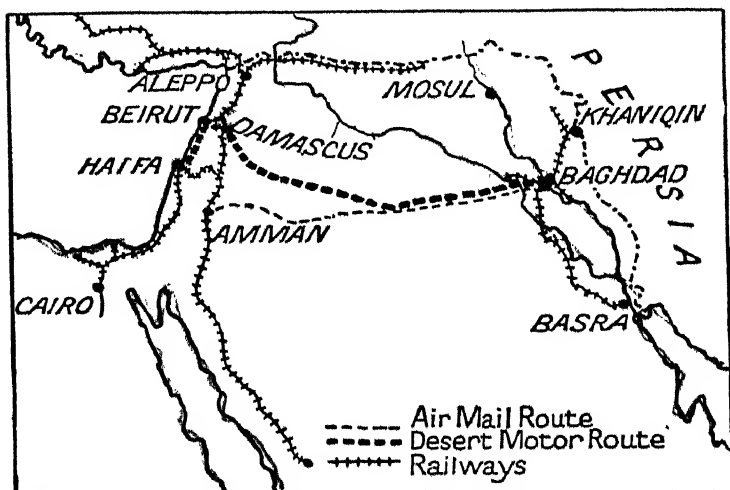


FIG. 49.—The desert routes of South-western Asia.

and stony, often, however, strewn with boulders. After a few low ranges, about 700 feet above the general level of the plateau, the ground slopes towards the valley of the Euphrates; the gravel surface gives place to dry alluvial mud, sometimes covered with camel-thorn, sometimes cracked and uneven, forming a very bad surface and yet sometimes as smooth as the finest road. The valley of the Euphrates is merely an enormous dry mud-flat and after rain the going is very difficult. A speed of 40–45 miles per hour is regularly maintained over good stretches. During the Druse rebellion of 1926 an alternative route from Jerusalem via Amman to Rutba was used, but the surface is bad and the route 200 miles longer. In the latter part of 1926, therefore, a northern route from Tripoli via Homs and Palmyra was sub-

stituted. The Company reverted to the present direct route after the rebellion. In addition to six-wheeler passenger cars, freight cars are now in service. £15 per ton was the freight charge when the writer was in Damascus in April, 1928, and the principal goods carried—apart, of course, from mails—were cocoons from Persia (200 tons a year), caviare and other foodstuffs. In 1934 freight charges had been reduced to £7 per ton.

### PALESTINE

The British mandated territory of Palestine<sup>1</sup> has an area of about 10,000 square miles—rather larger than Wales or about the same as the State of New Hampshire or Vermont—and a population in 1931 of rather over a million. The present boundaries of Palestine correspond fairly closely with the natural and historic boundaries of the Promised Land of the Jews, and were so framed as to include all the new Jewish colonies. Palestine was captured from the Turks by the British Forces under General Allenby in 1917–18, and remained under British Military Administration until July 1st, 1920. It is now administered by Great Britain under mandate from the League of Nations.

Physically and climatically there are three<sup>2</sup> parallel strips:

(a) The *Coastal Plain* lies along the Mediterranean. Broad in the south, and known as the Plain of Philistia, it narrows northwards as the famous Plain of Sharon, till the projecting mass of Mount Carmel reaches the coast. A further stretch of plain lies round the Bay of Acre, but the coastal plain almost disappears towards the Palestinian border. The climate is genial and marked by comparatively small variations in temperature. At Gaza the average temperature ranges from 53° in January to 80° in August; at Jaffa from 55° to 79°. Frost is practically unknown and snow never falls. The rainfall is almost entirely between October and April, and there is a gradual increase in total amount from south to north. Thus Gaza has forty-one rainy days and a fall of 16·5 inches; Jaffa has fifty-nine rainy days and 23 inches; Haifa has sixty-two rainy days and 27 inches, whilst Beirut in Syria has eighty-two rainy days and 35·7 inches. Although the distinction between the cool wet season and the hot dry season is the well-marked one, local custom still refers to the 'early' rains of October and November (the 'former rains' of the Bible) contrasted with

<sup>1</sup> Geographically Palestine is an integral part of Syria, and prior to the post-war separation of Palestine 'Syria' included Palestine. Thus the British Admiralty *Handbook of Syria* (1920) includes Palestine.

<sup>2</sup> For more detailed treatment see *Geog. Review*, Vol. XIX, 1929, pp. 581–602.

the spring rains (the 'latter rains' of the Bible) which are of fundamentally greater importance in agriculture. This is true of all Palestine and Syria. The maritime plain is thus climatically favoured; the soil is a light fertile loam with subsurface water

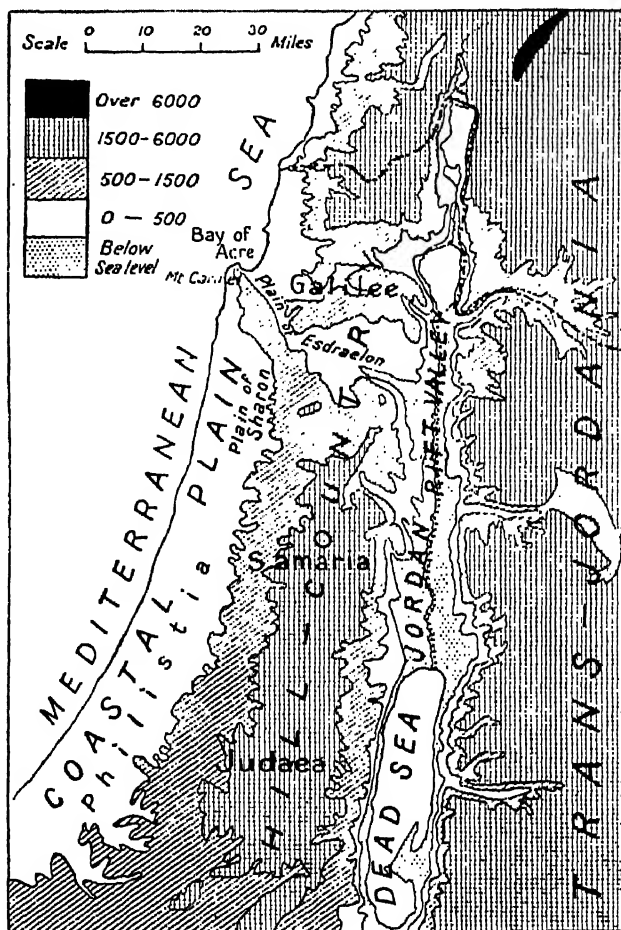


FIG. 50.—The natural regions of Palestine.

Note: the area marked Trans-Jordania is the natural region which may be designated by that name; the political territory extends only as far north as the Syrian boundary shown on the map.)

and the whole plain is proverbially fertile. Cultivation is still somewhat patchy, and it is mainly around certain areas that there stretches inland from the low sandy coast a succession of cornfields, vegetable gardens and pasture lands, interrupted occasionally by orange and banana groves. But it is this fertile



plain which most qualifies Palestine for the title of 'land of plenty'; it is this plain which has supplied the needs of warring armies from Rameses to Allenby. For the most part the plain is flat; here and there are low ridges up to 250 feet in height, and the whole plain is cut by innumerable transverse valleys or 'wādis'. The famous Jaffa oranges are grown mainly round Jaffa, which also serves as the port of Jerusalem. Modern Jewish colonies are bringing further tracts of this still underpopulated fertile region into cultivation.

(b) The *Hill Country*<sup>1</sup> forms a strip from 25 to 40 miles wide, roughly parallel to the Mediterranean coast. A spur of the hill country forms Mount Carmel and in the north of Palestine the hill belt approaches the coast. The hill country is divided into two quite separate and distinct blocks by the broad fertile Plain of Esdraelon (or Jezreel), which is a belt of lowland connecting the coastal plain of Haifa and Acre with the Jordan Valley. The block of hill country to the north is the 'Galilee' of New Testament times, and Nazareth lies towards the centre, overlooking the Plain of Esdraelon. The larger block to the south is the Samaria and Judæa of the New Testament, with Jerusalem occupying a central position in Judæa. It is not always realized that the places in Palestine which are of interest because of their association with incidents in the life of Jesus Christ lie in two separate regions—with 60 miles of country between the two groups. Nazareth, Cana and the cities of Galilee lie in the north; Jerusalem, Bethany, Bethlehem and Jericho are in the south. The hill country is built up of a succession of hard impervious limestones and softer flinty chalk of Cretaceous age. The beds are nearly horizontal and the individual bands of limestone vary from a few inches to several feet in thickness. 'Where the limestone prevails there are barren stony hills hemmed in and divided by innumerable valleys, mostly narrow and nearly all dry, and the horizontal beds give a tame outline to the hills, and their summits are flat and covered with stones. Where the chalk appears, the outlines are softer and broad white patches and bands run over the mountains; here the water has worn down the hills, and plains result from the softer formation.' In the north the hills of Galilee are less arid in appearance, the hills often sharper and more pleasing to the eye. Here basalt flows are frequent. The change from south to north in the hill belt is mainly the result of increasing rainfall. The rainfall is heaviest on the crest of the hill country (Hebron, 24 inches; Jerusalem, 26; Nazareth, 27) and rapidly decreases eastwards towards the Dead Sea and the Jordan rift. As a result

Called West Jordan Land by Banse.

the eastern slopes of the plateau from Hebron to the Dead Sea and Jerusalem to Jericho are practically desert—the 'Desert of Judæa'. The hill country as a whole suffers from considerably greater extremes of temperature than the coastal tracts. Jerusalem ranges from 45° in January to 74° in August, Nazareth from 49° to 79°. Frosts are usual in the winter months, and snow is by no means unknown. The natural vegetation of the Judæan Plateau is rough scrub with thorny bushes and a few dwarf oaks. The richer character of the Galilean Plateau is to some extent due to the heavy dewfall, especially in the late summer, and the rich soil—in many cases of volcanic detritus. There is little doubt that the hill country of Palestine was formerly far more extensively forested than it is now, and deforestation is held by some to be responsible for the present aridity of the country. Reafforestation is therefore one of the great aims in Palestine. Olive groves are important in Samaria especially, arable farming in Galilee, and locally there are vines and figs, but large areas are quite uncultivated and support but a few sheep or goats.

(c) The *Jordan Rift Valley* (El Ghor) is one of the most remarkable depressions on the surface of the globe. Both sides of this long straight valley, which averages 10 to 15 miles in width, are very steep, in places almost precipitous; the floor is almost level and from north of the Sea of Galilee to far south of the Dead Sea its surface is far below sea-level. It is drained by the Jordan, which flows first through a small lake and then through the Sea of Galilee (682 feet below sea-level) and then for 70 miles before emptying itself into the Dead Sea (1,292 feet below sea-level). The Dead Sea itself has an average depth of over a thousand feet, and its floor actually lies over 2,600 feet below sea-level. The drop from Jerusalem (+ 3,000 feet) to the Dead Sea (— 1,300) in a distance of 15 miles as the crow flies is remarkable. Except where the breezes from the Mediterranean penetrate, as they do along the Plain of Esdraelon and, to some extent, to the Sea of Galilee, the Jordan Valley is a very dry tract. Thus Tiberias, on the shores of the Sea of Galilee, has 20 inches, but around the Dead Sea the rainfall is very slight. As a result the vegetation in the southern portion is that of a desert; aridity is accentuated by the quantity of salt in the soil. This is one of the great difficulties in the way of proposed irrigation schemes. The high atmospheric pressure makes the climate curiously oppressive: temperatures are high, Tiberias, for example, ranging from 56° in January to 88° in August; Jericho from 54° to 89°. Frost is entirely unknown, the lowest recorded temperature at Jericho being 46°. Thus the crops possible are

those of the coastal strip, and if irrigation could be carried out this would form a valuable tract of land.<sup>1</sup>

**Population.** The peculiar problems of Palestine are bound up with the varied population and their religious interests. According to the official Census of November 18th, 1931, the population is made up as follows :

Moslems (mainly Syrians or Arabs)	759,952
Jews	175,006
Christians (mainly Syrians)	90,607
Druses, Samaritans, Bahais, Sikhs, Hindus and Metawilehs	9,589
<b>Total</b>	<b>1,035,154</b>

Thus Moslems form 73 per cent., Jews 17 per cent. and Christians 8 per cent. of the total.

The attitude of the British Government to the population is summed up in the famous ' Balfour Declaration ' of November 2nd, 1917, that ' His Majesty's Government view with favour the establishment in Palestine of a national home for the Jewish people, and will use their best endeavours to facilitate the achievement of that object, it being clearly understood that nothing shall be done which may prejudice the civil and religious rights of existing non-Jewish communities in Palestine '. As the above figures show, the Moslems formed the majority of the population, and naturally viewed with fear and apprehension the anticipated flooding of their country with Jewish immigrants, and their fears were only gradually calmed. Palestine is full of insoluble problems. It is the Promised Land, the ancestral home of the Jews ; but it is also the birthplace of Christianity and contains the spots most sacred to Christians ; further, Jerusalem, after Mecca, is the holiest of Moslem cities, and the Moslems have the rights of centuries of ownership. Jerusalem was in Moslem hands from 1244 to 1917. The problems extend to minutiae. The famous ' wailing wall ' of the Jews in Jerusalem is a fragment of the old Temple foundations ; the pious offer up supplications for its restoration, but they stand on Moslem ground to do so, and the rebuilding of the Temple would necessitate the destruction of one of the famous Mahommedan mosques. The Church of the Holy Sepulchre is shared by the various Christian sects, but a Moslem holds the key to prevent friction.

Fortunately Palestine is far from being over-populated. The population density is even now only about 100, whereas the coastal plains are capable of supporting a dense agricultural population. There is thus an abundance of land which can be

<sup>1</sup> An important scheme for the generation of electric power at Jisr Majame, using the waters of the Jordan, was completed in 1932.

used for Jewish settlement, and much has already been done. A difficulty lies with the Bedouin Arabs, who for centuries have wandered over hills and plains alike with their destructive sheep and goats, and who resent the new fences which trespass upon their grazing ground.

Some details of Jewish settlement may be of interest. There have long been considerable colonies of Jews in the cities—especially Jerusalem—but the modern schemes of settlement aim not at increasing the Jewish population of the cities but at



FIG. 51.—Jewish land in Palestine.

Its concentration in the fertile Coastal Plain and Plain of Esdraelon should be noted.

developing the land. Jewish immigration has been very considerable; the Jewish population at the Armistice was estimated at 55,000; in thirteen years it had increased, according to the official Census taken on November 18th, 1931, to 175,000; in January, 1935, estimated at 300,000, or roughly 2 per cent. of the 15,500,000 Jews estimated to exist. The Jewish immigrants are mainly from Eastern Europe—from Russia, the Baltic States and Poland—and the diversity of tongues has resulted in the reviving of the almost dead tongue, Hebrew (not Yiddish), formerly only

ed in religious services. The immigrants are going mainly to the land settlements which were commenced in 1878 when seven Jerusalem Jews acquired land for cultivation near Pethah Tiqva. The Jewish settlements now number over 130. They are grouped along the fertile Maritime Plain, but it is in reclaiming the fertile but formerly marshy malarial Plain of Esdraelon that the Jews have made remarkable progress. The total population of the settlements is now (1935) about 65,000 (compare 30,500 at the Jewish Census of April, 1927). More than thirty of the settlements are on land belonging to the Jewish National Fund (J.N.F.), which was established by the Zionist Organization for the purpose of acquiring land to remain the property of the Jewish people forever, and was founded with the assistance of the *Keren Hayesod* (Jewish Foundation Fund), also created by the Zionist Organization. The total area of the Jewish land exceeded 300,000 dunams (220,000 acres) at the Census of April, 1927.<sup>1</sup> Of this the J.N.F. owned 21 per cent.; the Palestine Jewish Colonization Association (P.I.C.A.), which sells its land to settlers on the instalment system over forty to sixty years, 43 per cent. Of the total owned by Jewish Associations, 46 per cent. (14,000 acres) was being farmed in April, 1927. The principal crops were: Wheat for grain, 25 per cent.; wheat for fodder, 1 per cent.; legumes, 13 per cent.; root-crops, 1 per cent.; orange, 10 per cent.; orchards of nuts, olives, etc., occupy much of the remainder. The large quantity of fodder indicates the attention being given to dairying. It cannot be claimed at present that the settlements as a whole are paying their way, but the hope lies in the healthy, country-loving generation which is now arising. Out of the total area of 10,000 square miles, the Jews estimate that one-third, or 3,000 square miles, is available for purchase and settlement. Allowing that half of this is cultivable, this gives about 1,000,000 acres as the total available for Jewish cultivators.

One of the great monuments of Jewish enterprise in Palestine is the remarkable city of Tel-Aviv adjoining Jaffa—a thriving concrete city where a few years ago was a waste of sand-dunes. The Jews are also interested in the development of 'heavy' industries in Palestine, of which the new port of Haifa is now the focus.

**Production and Industries of Palestine.** We have looked upon the Jewish activities in Palestine; the country considered as a whole is also essentially agricultural. Apart

<sup>1</sup> Jewish immigration varies widely from year to year. In 1927 there was a net loss, in the following years a gain of a few thousands. Unemployment renders it necessary to control immigration, and out of the large net immigration gain of 39,000 in the Jewish population in 1933 a number of 'visitors' are included—they remained as 'illicit' settlers.

from the vast stores of salts (common salt, bromide and others) which are associated with the Dead Sea area and are now being exploited,<sup>1</sup> minerals are unimportant. In 1931, Palestine (this was a poor year) produced: Wheat, 80,000 tons; barley, 41,000 tons; durrah, 17,000 tons; olives, 34,000 tons; lentils, 3,760 tons. There were in the country, 250,000 sheep, 440,000

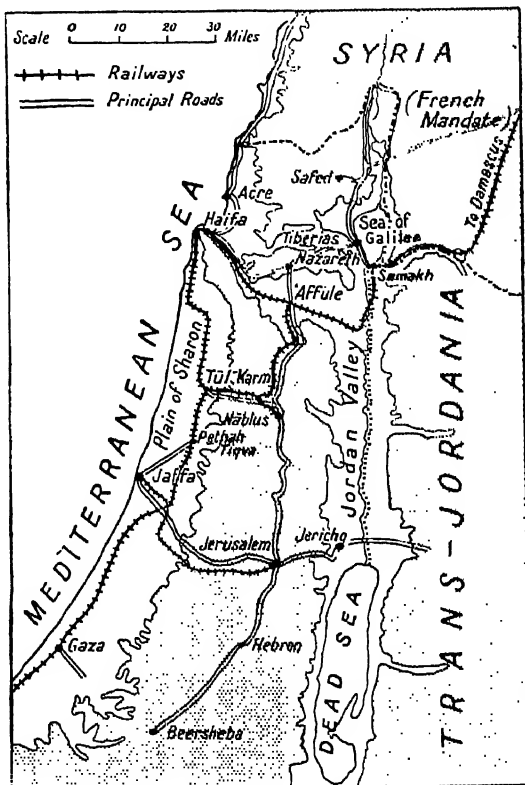


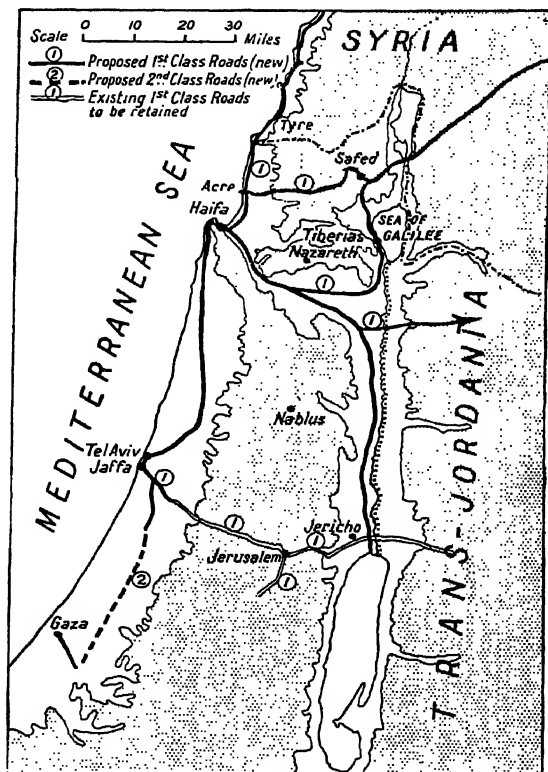
FIG. 52.—The present system of rail and road communications in Palestine. The main railway from Haifa to Egypt is broad (standard) gauge, that from Haifa to Damascus metre gauge. The absence of trunk roads on the plains should be noted.

goats, 25,000 camels and 150,000 cattle. The principal industries at present include the extraction of olive-oil at Nablus, Acre and elsewhere; soap-boiling at Nablus and Haifa; and wine-making in the older Jewish colonies of Rishon le Ziyon, Zikhron Ya'akov (Zichron Jacob), and Pethah Tiqva. There has been an interest-

<sup>1</sup> W. Irwin, 'The Salts of the Dead Sea and River Jordan,' *Geographical Journal*, Vol. LXI, 1923, pp. 428-440. The Palestine Potash Company commenced production in 1930, and markets bromine and potassium chloride.

increase in minor manufacturing industries (e.g. at Tel-Aviv). The orange production for export is almost entirely around Jaffa, and the acreage under oranges, grape-fruit and lemons was increased fivefold between 1926 and 1933. Good progress is being made in Government afforestation schemes.

**Communications.** Palestine has a system of fine metalled roads, delightfully placed for the tourist, but abominably placed



53.—The new system of trunk roads for Palestine proposed in 1928 and now partly constructed. The nodal position of Haifa should be noted.

the commercial development of the country. They are the descendants of tracks made when the hill ridges were the safest routes from robbers and their ambushes. They climb amongst the limestone hills to the best view-points, but avoid the fertile plains. Motor transport has become important in Palestine, and goods from the port of Jaffa destined for Amman in Trans-Jordan first climb 3,000 feet to Jerusalem, then drop 4,300 feet to the Allenby Bridge over the Jordan and climb again

4,000 feet to Amman. The distance is about 75 miles in a straight line, and a road from Haifa could avoid all hills save the final climb from the Jordan Valley to the plateau. The road system is being reconstructed so as to tap the rich agricultural lands and to converge on Haifa. Jaffa was supplanted as the chief port of Palestine by the completion in 1933 of the fine harbour at Haifa—the natural outlet of the country.<sup>1</sup> Haifa is destined probably to become the focus of road and rail transport, the chief manufacturing centre of the country; it is already the head of the 'Iraq oil pipe-line and a port for Southern Syria, including Damascus and the desert motor route. The population of Haifa increased from 26,000 in 1922 to 60,000 in 1933.<sup>2</sup>

**Foreign Trade.** The value of the exports has shown a general rise in recent years from roughly £1,100,000 sterling in 1922 to £2,600,000 in 1933 and rather more in 1934. Oranges and grape-fruit (taking 1933 as a basis) represent nearly 80 per cent. of the total; other items are soap, water melons, wine, olive and other oils, clothing and other manufactures. The imports are about four times the exports in value (1922-34), and include foodstuffs (flour, rice, sugar, etc.), manufactured goods (cotton, woollen and silk fabrics, machinery, motors, etc.), and raw materials (kerosene, benzene, wood, etc.).

### TRANSJORDANIA

Transjordan occupies a considerable tract of the plateau on the far or eastern side of the Jordan Rift Valley (East Jordan Land of Banse). It is agricultural and pastoral country merging eastwards into desert. Transjordan forms part of the Palestinian mandate, but the provisions relating to the establishment of a Jewish National Home do not apply to Transjordan, which is actually governed by a local Arab administration. Amman is the principal town and is linked by motor road with Jerusalem and Jaffa. The Hejaz Railway running through Amman towards Mecca is only in repair as far south as Maan. The Cairo-Baghdad air route crosses Transjordan.<sup>3</sup>

### REFERENCES

The literature on Palestine is considerable, owing to its historical associations. The best summary of geographical information (pre-war data) is in the Handbook prepared by the Geographical Section of the Naval Intelligence Division, Naval Staff, Admiralty, *Syria (including Palestine)*, 1920. A short general summary is given by L. P. Dana in his *Arab Asia* (Beirut, 1923) and in H. C. Luke and E. Keith-Roach's

<sup>1</sup> Minor ports are Gaza and Acre.

<sup>2</sup> For recent developments in Palestine see Norman Bentwich, *International Affairs*, Vol. XIV, 1935, pp. 369-88.

<sup>3</sup> Imperial Airways have an important aerodrome at Samakh (see Fig. 52).



*Handbook of Palestine* (1922). Sir G. A. Smith's *Historical Geography of the Holy Land* is the standard work. Recent developments may be followed in the Report on Palestine Administration (annual) and the Department of Overseas Trade Reports. An important work on the Jewish settlements is the *Report and General Abstracts of the Census of Jewish Agriculture* (1927), (Tel-Aviv, 1928). Important statistical data for the whole country is given in the *Annual Report of the Department of Agriculture, Forests and Fisheries*.

### SYRIA

As already explained, geographically Syria includes also Palestine, but for long popular usage restricted the name to that portion of Arab Asia lying north of the Holy Land. Pre-war has now been given to this popular usage of the name Syria, by the definition of the territory under French mandate which is known officially as Syria and which will be now considered. Syria, thus defined, lies between Turkey on the north and Palestine with Transjordan on the south; between the Mediterranean Sea on the west and an arbitrary boundary drawn through the Syrian Desert) with Arabia on the south and Iraq on the north-east. The total area of Syria subject to the French mandate may be estimated at 60,000 square miles, with a population of rather over 3,000,000, three-quarters of whom are Moslems.

**Physical Features.** The orography of Syria is of fundamental importance. As in Palestine, four belts roughly parallel the coastline may be distinguished, but they lack that precision of definition by which they are characterized in the southern areas. The four strips may be termed the coastal plains, the eastern ranges, the great central depression and the eastern ranges. Beyond the latter lie the eastern desert plateaus.

(a) The *Coastal Plains* are scarcely worthy of separation as a distinct unit. Cruising along the coast—a particularly delightful occupation, by the way, when the afternoon sun of early spring lights up the white limestone crags and throws them into relief against the bright green of nascent vegetation—one forms the impression that the mountains, lightly cloud tipped, rise directly from the blue Mediterranean. Actually, however, there is usually a narrow coastal plain which broadens out locally, especially in the vicinity of the ports of Alexandretta, Tripoli and Beirut. Like the Palestinian Plains, those of the coast of Syria are fertile and valuable; climatic conditions are similar except that the rainfall is usually somewhat heavier. The crops of the coastal plains supply the coast cities; in addition the plains of Tripoli and Sidon have world-famous orange groves, growing fruit for export. The Plain of Beirut has huge olive groves, and the Plain of Latakia is famed for tobacco. The chief

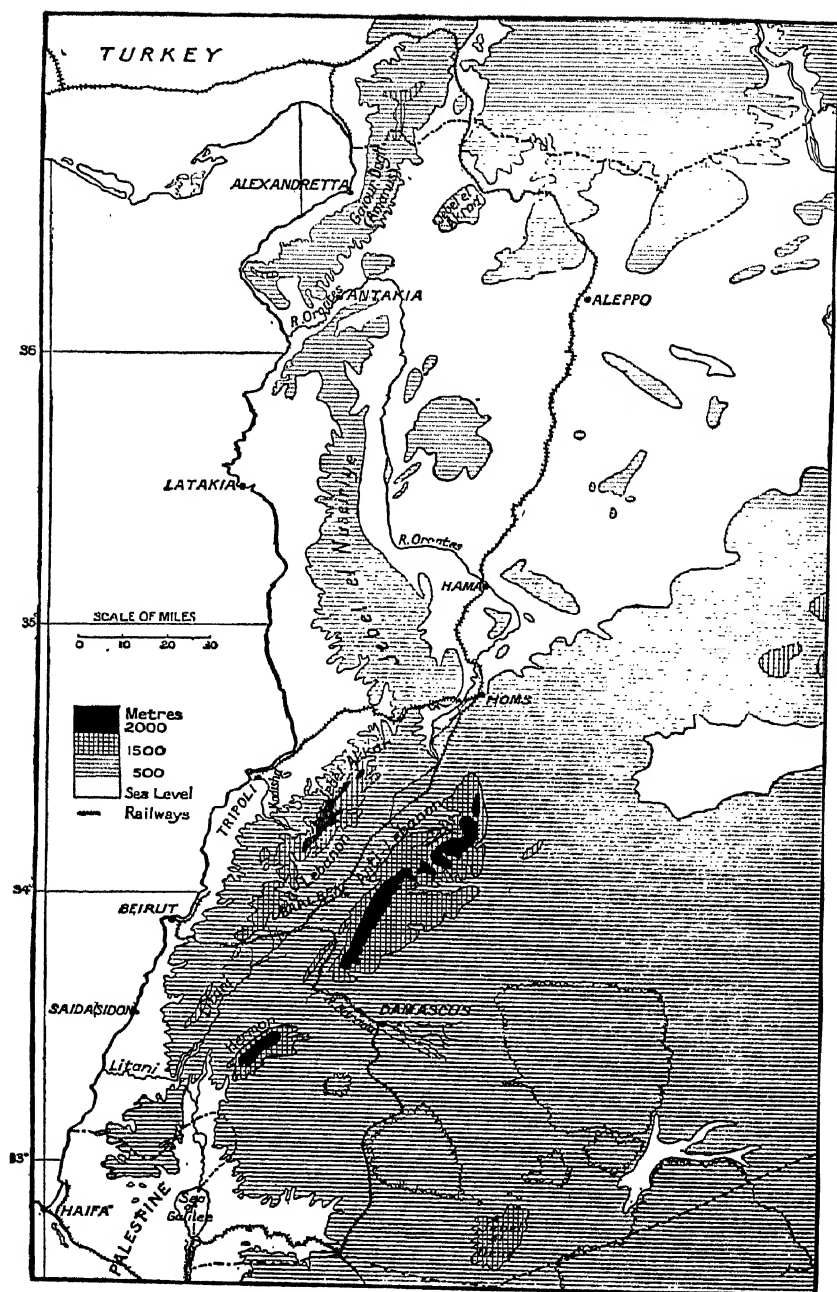


FIG. 54.—General map of Syria.

The irregularly outlined areas in the south are areas of recent lava, giving rise to desert of harrah type.  
Note: Antakia = Antioch.

ports of the coastal strip are the ports, of which the largest and the only one with a harbour is Beirut (135,000 in 1929). The other ports—Alexandretta, Latakia (20,000), Tripoli (37,000) and Sidon—like the ports of Palestine, have only open roadsteads.

(b) The *Western Mountain Ranges* in Syria vary considerably in character, and are divided by gorges or cols into three blocks from north to south :

1. The Amanus Range (Giaour Dagħ of the French, from the Turkish Gavur Dagħi) :  
The Gorge of the lower Orontes.
2. Jebel en Nuseiriye :  
The Homs-Tripoli Pass.
3. Lebanon.

The Amanus Range may be regarded as a spur from the Taurus Ranges with a trend from north-north-east to south-west. It separates the Plains of Cilicia from the Plains of Antioch and reaches the sea in a marked promontory. The Baghdad Railway sweeps far to the north to take advantage of the central pass long known as the Amanus Gates or the Pillars of Jonas and now often as the Bogtche Pass (in Turkish territory). The railway tunnels through the range a little to the south of the Pass. In the extreme north an easier pass is formed in the valley of the Pyramus River (also in Turkish territory) ; to the south there is the Pass of Baylān or the Syrian Gates.

The great central block begins south of the Orontes with a group of hills known in Roman times as Mons Libanus (Jebel el Akrād), but the main mass, further south, is known as the Jebel en Nuseiriye and extends as far as the pass utilized by the railway from Tripoli to Homs. The Nuseiriye mountains are so called from the name of an heretical sect of Manichaeism (also called Ansariyeh) who have amidst their mountain fastnesses maintained religious and to some extent political independence. The main ridge has an average elevation of about 3,000 feet, and on the east overlooks the Orontes Valley, towards which the slopes are almost precipitous. The slopes to the west, towards the sea, are gentler, steep slopes and rocky gorges alternating with small plateaus and cultivated areas. The mass is for the most part built up of limestone, bare peaks are seen in the higher slopes, but the lower slopes are wooded and forested. The climate is agreeable, for elevation tempers the summer heat ; winter is comparatively short and there is good rainfall. But the whole tract is the preserve of the Ansariyeh and remains comparatively little known.

South of the Tripoli-Homs railway, the southernmost of the three blocks of mountains begins as a thickly wooded

chain known as Jebel 'Akkār, which passes southwards into the most famous of all Syrian ranges—Lebanon. Several of the peaks of Lebanon are over 10,000 feet : from December to April the upper heights are swept by furious winds, snowstorms, and torrential rains. The peaks are snow-covered and avalanches are common on the precipitous slopes. The mountains are of limestone and goat-tracks seam the mountain sides, but most of the inhabitants live in villages in irrigated valleys where luxuriant growth fringes the streams. Wherever soil is found the rocky slopes have been reclaimed and terraces have been made at great heights, and on the otherwise bare mountain sides luxuriant gardens of mulberry and vine flourish. The once famous ' Cedars of Lebanon ' are now found in a few places, such as the head of the Kadîsha Valley, where the ancient trees owe their preservation to the fact that from time immemorial the grove has been regarded as sacred.

Lebanon really extends as far south as the Leontes Gorge (or gorge of the Nahr el Litanî), beyond which are the hills of Galilee.

(c) The *Great Central Depression* is not so well marked as in Palestine, nor does it sink below sea-level. In the north it is formed by the fertile Plain of Antioch round the Lake of Antioch, southward it is formed by the valley of the Orontes, which rises where the floor of the valley reaches its highest level, between Lebanon and Anti-Lebanon. Southwards the valley is drained by the Litanî. In the fertile Plains of Antioch mulberry trees are extensively cultivated and the production of silk is important; wheat, barley, durrah, sesamum, lentils, chickpeas, vegetables and fruit of all kinds are cultivated, and live stock are numerous. Liquorice root is found growing wild near marshes and on river banks, and abounds in the Plains of Antioch. The roots are dug up during the winter, and cultivation will be required in the near future to maintain the supply.

The middle part of the Orontes Valley lies in the country of the Nuseiriye, and though fertile is apt to be marshy and unhealthy.

Not so the upper course of the Orontes between its source and the town of Hama. Here the delightful valley known as the Plain of El Buqeî'a is about 10 miles wide. Though hot in summer, owing to its comparatively low elevation, it is very fertile, and presents a pleasant picture in the spring of wide cultivated fields with poplar and fruit trees. The railway from Aleppo to Beirut threads its way along the valley and affords the traveller glimpses of a charming though still under-populated land. A curious system of irrigation is practised: the force

the stream is made to revolve great wooden water-wheels which carry water up in little buckets and tip it into an irrigation channel. Homs is a prosperous town in this tract.

There is a scarcely appreciable divide between the headwaters of the Orontes and those of the Lītanī, which has a narrower, less important valley. Near the divide are the famous ruins of Ba'albek (Heliopolis).

(d) The *Eastern Mountain Ranges* do not form a continuous series; sometimes they are merely the edge of the undulating plateau. In the north the plateau is in general bare, treeless, and waterless, becoming more and more arid as it approaches the desert. Except in the districts of Aleppo and where it approaches the Orontes high plains near Hama and Homs—here there is a comparatively small difference in elevation between the plateau and the Plain of El Buqei'a—the rainfall is generally low. Except where recent lava flows cover the country with a stretch of barren boulders, much of the land is cultivable and can support considerable crops. It is in this country that one sees villages of beehive-shaped huts—often the first dwellings of Bedouins who have forsaken their tents and taken to the plough.

Aleppo (177,000 in 1929) remains to-day, as it always has been, the great centre of the northern part of this area; the converging-point for the routes from the Mediterranean and the starting-point for the Syrian Saddle route to Mesopotamia. The picturesque citadel built on a high mound in the heart of the city, the old walled city with its narrow vaulted alleyways, its ceaseless streams of donkeys and camels, its throngs of Arabs in their picturesque flowing robes, its dim restful khans (wholesale warehouses), its flat-topped dwelling-houses, brilliant in the glaring sunlight, its occasional domed mosques with their slender minarets, form a nearer approach to the Westerner's idea of the East than the visitor to Eastern towns can usually dare to hope for.

The eastern range, as distinct from merely the edge of the plateau, begins opposite Homs and is known as Anti-Lebanon—separated from Lebanon by the upper valley of the Orontes. Many of the crestlines are over 6,000 feet; Anti-Lebanon is wilder and grander than Lebanon, largely on account of the lower rainfall and sparseness of vegetation. Towards the southern end of Anti-Lebanon the massif is cut through by the narrow rocky gorge of the Barada, a gorge whose tortuous windings are followed by the metre-gauge railway from Beirut to Damascus. Damascus, to which reference will be made later, lies at the foot of Anti-Lebanon where the Barada disgorges

on to the plain. South of the Barada Gorge the range rises again to the noble snowy heights of Mount Hermon—the summit of which is about 10,000 feet.

South of Hermon the eastern mountain ranges as such disappear and are again replaced by the edge of the plateau, the southern portion of which, lying in Transjordan, has already been mentioned.

(e) The *Eastern Plateau* and the Syrian Desert. It has been pointed out that sometimes there is a range of mountains bounding the plateau on the west, sometimes there is not. When the mountains do not exist, the rain-bearing winds penetrate far to the east—as they do via Aleppo and along the Syrian Saddle. In the lee of Anti-Lebanon, on the other hand, the desert stretches right to the almost stark slopes of the mountains themselves. Motoring from Damascus along the eastern flanks of Mount Hermon towards Palestine, it is of the greatest interest to notice the gradual increase in the richness of the vegetation as one rounds the hill belt and comes to the plateau edge before dropping down into the Jordan Valley by the Sea of Galilee; from the desert wastes beyond Damascus it is a wonderful experience in springtime, when the slopes to the Jordan Valley are ablaze with wild flowers.

We have seen that Damascus lies at the foot of—indeed, climbs the lower slopes of—the easternmost range of Anti-Lebanon just where the Barada emerges from its gorge. It is the Barada which is responsible for the very existence of Damascus. Its waters are made to supply the fountains and water the land of what is a vast garden on the edge of the desert. The irrigated Damascus Plain has an area of about 150 square miles. The luxuriant gardens and green fields produce fruit of all kinds (especially apricots and grapes), as well as vegetables and grain in abundance. Groups of silver poplars—the wood of which is much used in Damascus—line the watercourses and are scattered over the whole area. As well as the city of Damascus with its 194,000 inhabitants, over a hundred villages lie clustered in the plain. Damascus, as a result of its situation, cut off from maritime influences, has a climate of marked continentality—with temperatures ranging from an average of 43° in January to 83° in July. Frosts are frequent; temperatures as low as 26° have been recorded. The rainfall, naturally, is low. Damascus is a city more modern in appearance and lacking the charm of Aleppo.

South of Damascus, where Mount Hermon no longer cuts off the breezes from the ocean, lies the great Plateau of Hauran—a vast treeless prairie, noted specially for its wonderful

heat crops' and capable of becoming a great granary not only for Syria, but with a surplus for export.

South of Hauran is the elevated, isolated Plateau of Jebel ed rūz—the home of the Druse sect of Moslems.

But sooner or later all parts of Syria—except in the extreme north—pass eastwards into desert.

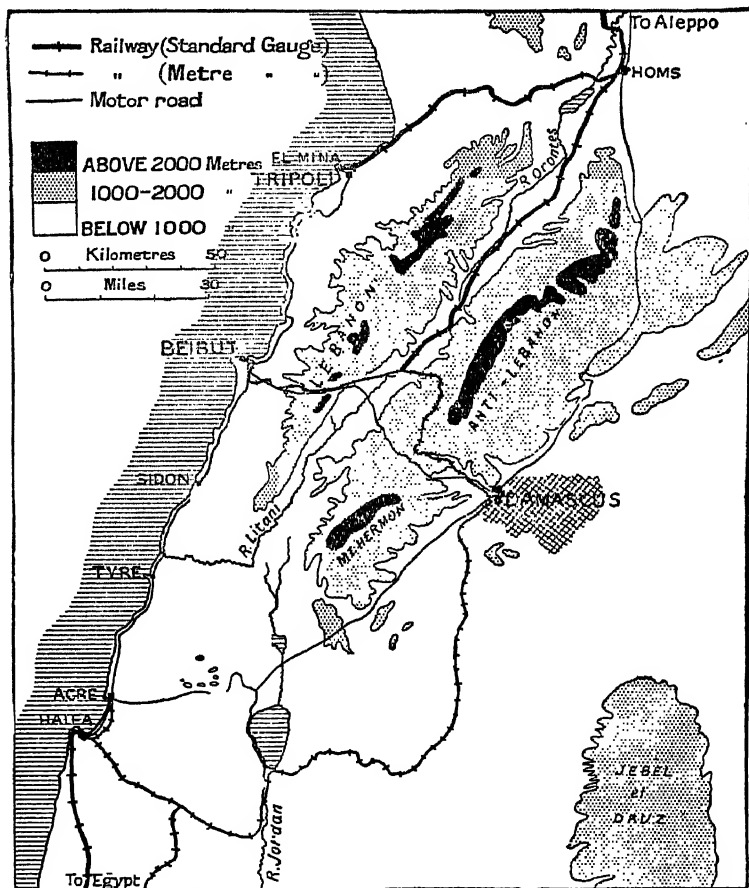


FIG. 55.—The position of Damascus.

The cross hatched area shows the approximate limits of the irrigated area. This map shows the rival ports for Damascus—Haifa and Beirut.

**Population.** It has already been mentioned that three-quarters of the inhabitants of Syria are Mahommedans. The remaining quarter are nearly all Syrian Christians. Of the 500,000 Moslems about 1,075,000 are Sunni Moslems; Alaouites

number 228,000, and Druses 86,000. The bulk of the population is of Arab origin, but there has been a large influx of foreign elements, including Turks, Kurds, Circassians, Armenians, Jews and Persians. It is largely as a result of the religious differences among the Moslem sects that the French have organized Syria into four territories (*états*). The State of Grand Lebanon extends from north of Tripoli to Palestine, and from the sea to the crest of Anti-Lebanon, thus including Beirut and Tripoli. The Latakia State includes Latakia and the Nuseiriye country; the State of Jebel ed Drüz is the land of the Druses, south of the Plateau of Hauran; whilst the remainder is the State of Syria proper—including Aleppo, Damascus, Alexandretta, Hama, Homs and the Plateau of Hauran.

**Production and Industries.** Syria is essentially an agricultural country. In 1931-32, 1,300,000 acres, or roughly half the cultivable area of the country, were under crops. The principal products are shown in the following table:

PRODUCTION IN SYRIA.

Crop.	Metric Tons.	
	1926.	1932 (poor year).
Wheat . . . . .	373,000	283,500
Barley . . . . .	236,000	205,000
Maize . . . . .	99,000	34,000
Millet . . . . .	—	40,000
Oats . . . . .	19,000	13,500
Olives . . . . .	85,000	30,600
Sesamum . . . . .	30,000	—
Chickpeas and lentils . . . . .	50,000	54,000

More than half the wheat is grown in the Damascus Plain and the Hauran Plateau. The cultivation of cotton has been considerably extended in recent years. It is mostly of the short-stapled 'baladi' variety, for which the demand is decreasing, and it is being replaced by 'Texas' seed. 2,000 tons of cotton were produced in 1927. Around Latakia, Aleppo, Beirut and Damascus much tobacco is grown. Wine is produced especially in Lebanon.

The silk-rearing industry is an old and important one. The white mulberry is extensively grown in Northern Syria and around Damascus for feeding the worms, and Beirut, Tripoli, Latakia, Damascus, and Aleppo are the centres of the industry;



the production of cocoons in 1933 was nearly 1,400 metric tons (equivalent to nearly 138 tons of raw silk), but Canary bananas are replacing mulberries.

Syria has large numbers of sheep and goats, and there are over 2,000,000 sheep in the Aleppo district alone. Syria is, however, poor in minerals. Good iron-ore occurs in North Lebanon, lignite in South Lebanon.

**Communications.** Something has already been said of the railways of Syria. The mixture of gauges is unfortunate: it prevents through running from Northern Syria to Palestine. The broad gauge runs from Aleppo to Tripoli, but not to the better port of Beirut: the slow narrow-gauge trains between Damascus and Beirut now have a serious competitor in the motor. Nevertheless, Syria is fairly well supplied with railways and has over 2,240 miles of first-class road. The trans-desert motor traffic has been considered above.

Most of the sea-borne foreign trade passes through the port of Beirut and is carried in French, British and Italian bottoms.

**Foreign Trade.** As in Palestine there is an unfavourable balance of trade, the exports being rather less than half the imports in value (1933). Cotton and cotton thread, raw wool, animals, raw silk and cocoons, fruits and nuts are the chief exports; textiles (cotton, wool and silk) account for a third of the imports, but there is also a large import of cereals—Syria is a grain-growing country which should be self-supporting. The value of the imports was—£Syrian 45,000,000 in 1933; exports, £Syrian 7,800,000. The northern branch of the 'Iraq oil pipeline terminates at Tripoli.

#### REFERENCES

The Admiralty and Foreign Office Handbooks contain full descriptions of the country. Recent accounts of the economic progress of the country are contained in the Reports published by the Department of Overseas Trade.

#### ARABIA

Arabia proper is a great peninsula with an average breadth of 700 miles and a length of 1,200 miles, having thus a total area of about 1,000,000 square miles, or considerably greater than that of the Indian peninsula. The Arabs usually refer to their home as the 'Isle of the Arabs', emphasizing thus the geographical isolation of the peninsula. With the Red Sea on the west, the Arabian Sea on the south-east, the Gulf of Oman and the Persian Gulf on the north-east, Arabia is cut off from the rest of Continental Asia on the remaining side by a great desert barrier, the desert of the northern Nefud.

Arabia, properly speaking, extends roughly as far north

as latitude  $30^{\circ}$  or  $31^{\circ}$ , though the great triangle of the Syrian Desert or the Hamād, which the ancient geographers included in Arabia, lies to the north of this line.

The broad physical features of the peninsula are already familiar—the plateau with its high western edge overlooking the Red Sea and its long, gentle slope to the Persian Gulf. Actually the edge of the plateau is higher than its function merely as an edge of an elevated block would warrant. Peaks in Midian and Yemen rise to over 8,000 and even 10,000 feet and the western and southern edges of the plateau appear as mountain ranges, not only from the sea, but also from the interior. This is due in part to the presence of volcanic piles, or of lava-flows resistant to denudation which have protected the underlying sandstones and in part to the different nature of denudation at high levels producing jagged outlines which contrast with the sand-strewn plateau slopes. The recent explorations of H. St. J. B. Philby have shown that the general eastern slope is not as simple as was supposed; a great ridge of highland 4,000–5,000 feet high, and with granite peaks rising to over 6,000 feet, crosses the heart of the peninsula from northern Yemen to Sedeir. Most of the sand of the plateau is derived from the disintegration—largely due to the alternate heating by the sun's rays and the cooling at night of the rocks—of mesozoic sandstones which were deposited over the ancient crystalline massif.<sup>1</sup>

There are no really perennial rivers in Arabia; their place is taken by countless river-valleys (wādis), which carry water after rainstorms. The high western edge of the plateau is naturally the main water-parting. The wādis which descend to the Red Sea have deeply eroded beds which form a great obstacle to communication from north to south; at the same time the waters are useless for navigation or irrigation. The wādis which descend towards the Persian Gulf (though often never reaching it), on the other hand, are long and shallow, their floors are often so slightly depressed below the general level that the traveller may cross them without being aware of their existence. Whereas the western wādis to the Red Sea are obstacles to communication, the wādis to the east are of distinct value. Though they may not carry permanent surface water, water is at all times present below their beds and may be reached by wells, and where the water level rises sufficiently near the surface strings of oases are found. These broad, shallow valleys are

<sup>1</sup> South-eastern Arabia or Oman is unique in that its tectonic features are allied to those of Persia and Baluchistan to the north. See G. M. Lees, 'The Physical Geography of South-eastern Arabia,' *Geographical Journal*, Vol. LXXI, 1928, pp. 441–470.

characteristic of Arabia; the 'badland' type of desert scenery common in many deserts—as in parts of Central Asia—is rarely seen.

Climatically, the great feature of Arabian conditions is dryness. Intense dryness makes the heat of the day comparatively bearable and, generally speaking, conduces to cool nights. The healing virtues of dry desert air have become proverbial, but when one visits the fringes of dry areas and sees the effect of clouds of dusty, germ-laden air in the diseased eyes, nose and mouth of dwellers near by one wonders why. It is in the heart of a vast, dry tract such as Arabia that the familiar statement is justified; conditions seem quite unsuited to germ life: human fertility is great, mortality is low, and longevity is the rule. The limiting factor in the multiplication of the human race is food and the advantages of the healthy climate tend to be outweighed by the shortage of food. Much of Arabia may be described as truly rainless. Yemen profits by the summer monsoon, heavy storms penetrate along the western watershed to beyond Mecca. Northern Arabia, not being shut in by mountains from the Mediterranean, gets slight winter and spring rains from that region. The heights of Oman in the south-east also attract a slight rainfall. It is the heart of the plateau which is rainless.

Arabia lies in the world belt of greatest heat in summer; the hottest regions are naturally the littoral tracts of Oman, Yemen, the Red Sea and Gulf coasts. In winter, snow usually appears on the highest crests of the northern heights, and occasionally on the surface of the plateau in the extreme north. The heights of Yemen and the western ridge have frost but not snow.

The dweller in more favoured lands might be tempted to regard the whole of Arabia as desert, with a few scattered oases. Actually, however, one should distinguish:

- (1) True deserts.
- (2) Dry steppes or steppe-deserts.
- (3) Oases and cultivated land.

*True deserts*, wherein vegetation is absent, and where all fodder and water necessary for the journey from oasis to oasis must be carried, are of four kinds:

1. *Dahanah* is comparatively hard gravel plain, covered at intervals with sand belts of varying width. Ground water may be present at depth, but dahanah may elsewhere form a complete barrier.
2. *Nefūd* is a continuous area of deep gravel or sand, formed by wind action into high dunes.

3. *Ahqāf* is very soft dune country and cannot be crossed except in narrow belts, owing to the extreme physical labour involved. It is rare in Arabia.

4. *Harrah* is the name given to tracts of rough lava surface which cuts the feet of man and animals to pieces.

Fig. 56 shows roughly the areas occupied by true desert in Arabia. In the south there is the huge Ruba'el-Khālī ('The

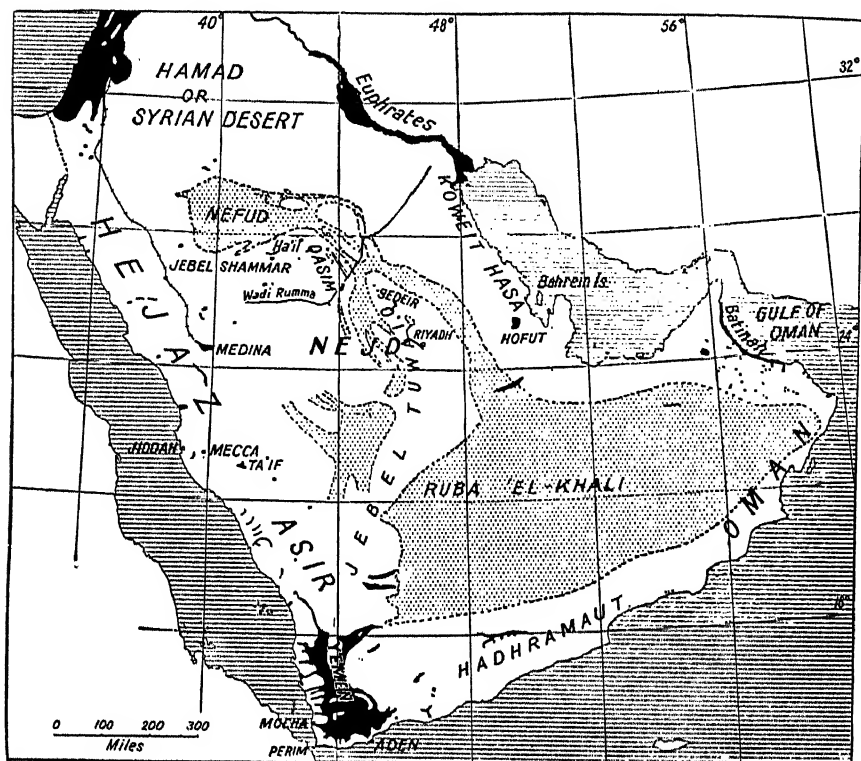


FIG. 56.—General map of Arabia.

In black, cultivated land; dotted, deserts; blank, steppes and steppe-deserts.

Abode of Emptiness'), termed also in the vulgar tongue Er-Raml, 'The Sand' *par excellence*. This vast stretch, 400 to 500 miles wide—dahanah and nefūd in the east, ahqāf in the west—completely cuts off the southern coasts from the heart of Arabia. The desert was crossed for the first time in 1931 by Mr. Bertram Thomas. A tongue of this great desert stretches northwards and cuts off Nejd in the centre from the Persian Gulf. It is mainly of dahanah type and northward passes into the nefūd which

eparates the Syrian steppe-desert from Central Arabia. The important point to notice is that the deserts stretch as a great semicircle around the heart of the peninsula. The central tract of desert shown in Fig. 56 is added as a result of Philby's explorations.

*Dry Steppes or Steppe-deserts*, which may be likened to what we have elsewhere called by Sir Aurel Stein's name of 'tame deserts', occupy most of the rest of Arabia. They are vast tracts, with a hard or dusty surface, level or undulating, which justify the use of the designation steppe by having occasional natural water-holes and permanent coarse vegetation in hollows. The inhabitants include camel-breeding nomads and what to a European would seem useless desert supplies sufficient sustenance to maintain life amongst these frugal folk.

The *Oases and Cultivated Lands* of Arabia lie in two tracts:

(a) The heart of Arabia, surrounded by a ring of deserts.

(b) The tracts along the coasts and margins.

In the heart of Arabia, in the region sometimes designated Nejd, lie three groups of more or less connected oases. Jebel Hammar receives the drainage from two ranges and includes the towns of Hā-il and Feid and a score of villages—a real oasis surrounded by desert. Qasim owes its fertility to constant round water from the great Wādi Rummah and includes the large settlements of Aneizah and Boreidah—the largest and most commercial towns of Central Arabia—and about fifty other settlements. Nejd is by far the most extensive group and hence the frequent use of this name to cover the whole of Central Arabia. The chief town, Riyādh, lies in the central oasis, but there is a large series of settlements.

The outer ring of fertile tracts reaches its greatest importance in the Yemen and the south-east. On the east are the settled tracts of Hasa; along the shores of the Gulf of Oman is the fertile littoral of the Bātinah district of Oman. The south coast is almost entirely desert until longitude  $50^{\circ}$  is reached. Then the coastal tract becomes fertile in patches and vegetation runs inland up the valleys towards the plateau. In Yemen, along the shores of the southern Red Sea, there is a low coastal strip, fertile where the wādis reach the shore, and behind it the towering slopes rendered fertile by the monsoon rains. Even over the crest, the rainfall is sufficient to give good steppe land. This was the part of Arabia known to the ancients as 'Arabia felix', the home of the celebrated Mocha coffee. The excellence of the coffee, grown on the slopes, is said to owe a great deal to the rising mists which protect the trees from the heat of the day. Northwards along the Red Sea, fertile tracts become fewer

and the interest of the Hejaz lies in the celebrated Moslem sacred cities of Mecca and Medina—both utterly different from other Arabian cities in that they depend for their existence on pilgrims. Hejaz, as a whole, is divided into northern and southern halves by a huge uninhabited stretch of *harrah*, lying between Medina and Mecca and stretching to a point on the Red Sea.<sup>1</sup> Of great importance to Mecca is the near-by oasis of Ta'if.

The population of Arabia can only be guessed at—it is possibly between 5,000,000 and 7,000,000. Of this total there are probably  $2\frac{1}{2}$  million along the Red Sea coasts (including over  $1\frac{1}{2}$  million in Yemen);  $1\frac{1}{2}$  million in the rest of the coastal settlements (including half a million in Oman); half a million in the central oases, and about a million nomads. It is the nomadic folk who have influenced the history, not only of Arabia, but of the whole world, out of all proportion to their numbers. There is a virtual impossibility of increasing the food-producing area anywhere; climatic conditions favour the growth of a virile and fertile race. With a high birth-rate and low death-rate there are two possibilities, emigration or death from starvation. 'The surplus population usually remains for some time within the peninsula, gradually accumulating and tending to form new nomadic groups, which try to establish rights to wells and pasturage already occupied. At last the action of some tribe or tribes, or sheer want, forces them out, with all their predatory habits and defective experience of settled life, towards the borders of Egypt, Syria or Mesopotamia.' In ancient times the Semitic invasions of Babylonia, the Canaanite invasion of Syria, the Hyksos invasion of Egypt, and the Hebrew invasion of Palestine are all to be explained in this way: in more recent times the settlement of North-western Africa. Hardly any part of the peninsula is unaffected by the features of life on steppe and desert, agriculture is impossible in three-quarters of the area; even the single family must keep on the move in order to live. Yet it is these wandering folk, with their fierce struggle against nature, their distrust of their fellow-man, who may rob them of their mess of pottage, who have given the world the great philosophic religions of Judaism and Mahommedanism and, obviously to some extent, Christianity.

Though more numerous, the settled folk of the oases are of less real interest. Among the products of the oases, the chief food is the date, though grain is grown in considerable quantities

<sup>1</sup> See the description of the geography of Hejaz in D. G. Hogarth, 'Some Recent Arabian Explorations,' *Geographical Review*, Vol. XI, 1921, pp. 321-337.

the larger oases. The fine Mocha coffee is exported in small quantities, the cheaper Brazilian or Javanese being imported for home use. Gums, hides and wool are produced and exported in small quantities. The breeding of camels is carried on by nomads, and camels are sold to surrounding settled peoples; the breeding of the famous Arab horses (chiefly in Nejd) is less important. Asses are only of slightly less value as means of transport than camels and are bred in large numbers in Hejaz, Yemen and Nejd.

Nearly all the inhabitants of Arabia are Moslems, but adhere to several sects. The great annual pilgrimage to Mecca (and, to a less extent, to Medina) is a feature of the greatest importance. The annual influx is estimated at between 100,000 and 500,000, and the passage of pilgrims is the occasion of much trading. It is also, unfortunately, the great cause of the spread of epidemic diseases. The pilgrims follow four chief routes:

1. From Damascus to Medina and Mecca. The railway from Damascus to Medina at present (1935) only functions as far as Maan in Transjordan. A motor route from Najaf to Medina was opened in 1935.
2. From Cairo via Sinai and Yambo' to Medina or Mecca.
3. From Baghdad through the heart of the peninsula via the oasis of Ha'il.
4. By sea to the port of Jiddah—this is by far the most important route now.

Before the War much of Arabia was, at least nominally, under Turkish influence or constituted part of the Ottoman Empire. Since 1913 the Arabs have really been working out their own salvation unchecked by foreign control. There now (1935) exist three independent kingdoms—the kingdom of Saudi Arabia (Hejaz and Nejd) and the State of Oman. The Sultanate of Kuwait is under British influence; the south coastal tracts come under the British Protectorate of Aden; the Bahrain Islands are British; Hadramaut is loosely under British influence, whilst the Yemen is at present divided.

#### REFERENCES

This totally inadequate account of a vast and important tract is, fortunately, all that the exigencies of space will allow. General accounts are given in *Arabia* (Handbook prepared under the direction of the Intelligence Division, Admiralty), 1920, Dana's *Arab Asia* and Hogarth's *Western East*. Much exploration has been carried out in recent years especially by English explorers, and numerous papers will be found in the pages of the *Geographical Journal*. In addition there are the great classics of C. M. Doughty (*Travels in Arabia Deserta*, 2 vols., London, 1921), Blunts (Southern Arabia, 1900), Colonel T. E. Lawrence (*Revolt in the Desert*, London, 1927), H. St. J. B. Philby (*The Heart of Arabia*, 2 vols., London, 1922), B. Thomas (*Arabia Felix*, 1933)—all of them delightful

books. See summary of Lawrence's and Philby's works by D. G. Hogarth, 'Some Recent Arabian Explorations,' *Geographical Review*, Vol. XI, 1921, pp. 321-337.

The explorations of Alois Musil in the north have also been published recently by the American Geographical Society (see Review in *Geographical Journal*, September, 1928). Recent developments in political geography may be followed in the *Statesman's Year-Book*.

## ADEN

Aden is a volcanic peninsula on the south coast of Arabia, about a hundred miles east of the Straits of Bab-el-Mandeb. The settlement includes also the island of Perim in the Straits themselves. Aden is important as a fortified coaling station on the highway to India and the East. Aden includes an area of 75 square miles, Perim 5 square miles, but in addition the hinterland of Aden forms a British Protectorate with an area of 9,000 square miles. Aden is under the administration of the Presidency of Bombay. The population is 48,000.

The island of Sokotra, a familiar sight to travellers to India, often as a flat-topped mystery in the midst of a glassy sea, is also under British protection. It has a small pastoral population.

The Bahrain Islands in the Persian Gulf are ruled by a chief under British protection. They support a population of 120,000, and much of the trade with Nejd passes through Manama, the capital and commercial centre. Bahrain is also the centre of the famous pearl fisheries of the Persian Gulf. Oil was discovered on the islands in 1932 and on the mainland in 1935.

## 'IRAQ

'Iraq was freed from the dominance of Turkey during the Great War and became an independent State under Great Britain as the mandatory power. The modern independent kingdom, under King Faisal, dates only from December 14th, 1927, when a treaty was signed between Great Britain and 'Iraq, whereby the former recognized the complete independence of the latter. The name Mesopotamia, often used as if it were synonymous with 'Iraq, is properly the land 'between the rivers' (Gk. *meso* = between and *potamos* = river).

Broadly speaking, 'Iraq is the area watered by the two great rivers, the Tigris and the Euphrates, and their tributaries, stretching as far as the mountains of the Armenian massif on the north and the mountains on the borders of Persia on the north-east, as far as French Syria on the west and to an artificially defined line on the south.

The whole Tigris-Euphrates Valley is not infrequently referred to as the 'Cradle of Humanity' or better as the 'Cradle of Civilization', a reference to the ancient civilizations which



ourished in this region from 4000 B.C. onwards. The ancient kingdom of 'Akkad, later and better known as Assyria, occupied the northern parts of the basin, with its capital at Nineveh, near the modern Mosul. The Kingdom of Sumer or Babylonia occupied a more southern region, with its capital Babylon on

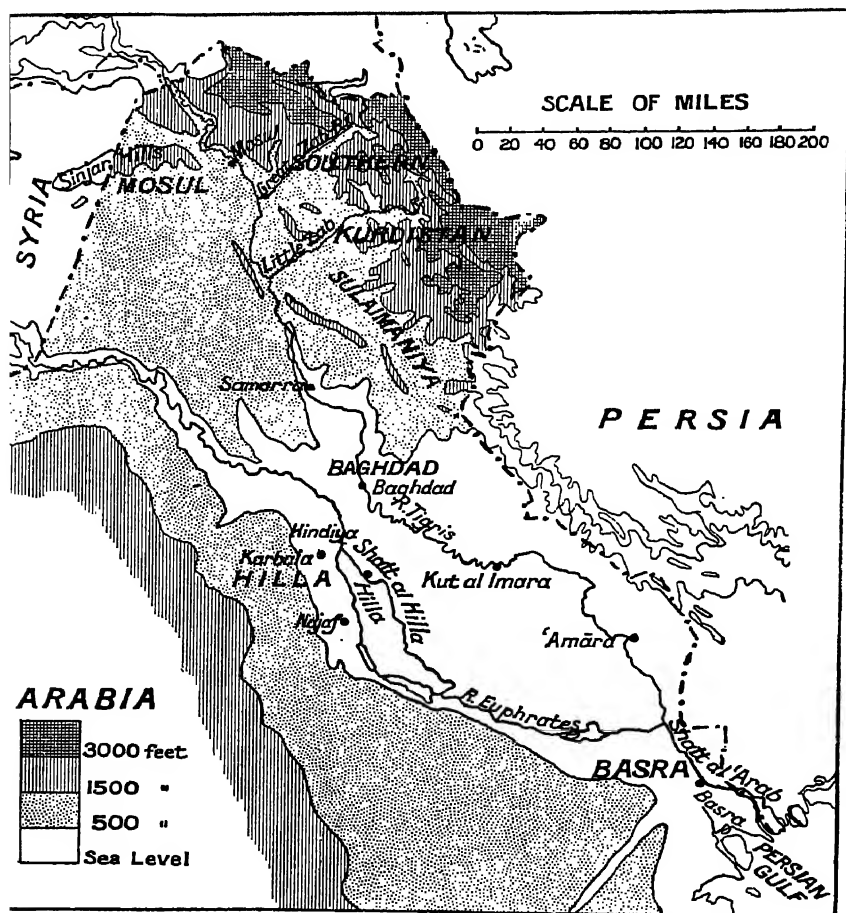


FIG. 57.—General map of 'Iraq.

the then course of the Tigris. The name Chaldea, properly belonging to part of the south, was applied by Roman writers to the whole area, as distinct from Media and Elam on the plateau.

The modern Kingdom of 'Iraq has an area of 177,100 square miles—considerably larger than the whole of the British Isles

—and comprises the former Turkish vilayets of Baghdad, Basra and Mosul, with a population in 1932 of 2,857,000.

Physically 'Iraq falls into four divisions<sup>1</sup>:

- (a) The mountains of the north-east (Kurdistan).
- (b) Upper 'Iraq.
- (c) Lower 'Iraq.
- (d) The desert fringe.

*Kurdistan.*<sup>2</sup> The wildest and least accessible part of 'Iraq is Central Kurdistan—a highland region lying on the borders of Turkey and Persia. Peaks on or near the Persian frontier rise to over 10,000 feet. The successive ranges decrease in elevation towards the plains: the mountains are generally barren or but sparsely wooded, but good pasture and cultivable land occurs on the lower slopes and in the valleys. The inhabitants of this tract are mainly the lawless Kurds. Included in this tract are the fertile upland plains of es-Sulaimaniya.

*Upper 'Iraq* corresponds roughly with the Assyria of old, embracing a large portion of 'Mesopotamia'—the land between the rivers, as well as the country between the Tigris and the foothills of Kurdistan. Upper Mesopotamia consists chiefly of an open, undulating, treeless plain with level areas in places and ranges of low hills in others. West of Mosul the Sinjar Hills even rise to 3,000 feet. South-east of Mosul, that is, between the Tigris and the frontier range, are rolling valleys which have much grass in spring, separated by sandstone ridges. Cultivated land in Upper 'Iraq is largely restricted to the deep broad valleys of the Euphrates and Tigris and the tributaries of the latter, the Great and Little Zab. In the Mesopotamian doab much of the land is arid and the soil often ruined by saline or alkaline deposits.

*Lower 'Iraq* commences a little above Baghdad and offers a great contrast to Upper 'Iraq. Practically the whole area is level and slopes but very gradually to the Persian Gulf. Baghdad, for example, is only 107 feet above sea-level. The Tigris and the Euphrates are raised slightly above the general level of the plain and in many places may be traced the high banks of ancient canals. Here and there are mounds which mark the sites of ancient cities, and near Basra is an isolated, extinct volcano rising to a height of 300 feet—but these are the only elevations

<sup>1</sup> E. Banse (*Die Türkei*) divides Mesopotamia into four divisions—Northern, Eastern, Central and Southern. Central corresponds roughly with what is here called Upper 'Iraq, Southern with Lower 'Iraq and Northern (in which Banse includes a large area of Turkey proper) and Eastern with the mountain fringe.

<sup>2</sup> W. R. Hay, *Two Years in Kurdistan* (London: Sidgwick and Jackson, 1921).

rich break the monotony of the level surface. The soil of Lower 'Iraq is a fine fertile alluvium—a powdery dust when dry, tenacious mud when wet—which is still being added to by the annual overflow of the Tigris and Euphrates. In the days of the Babylonian Empire a great system of inundation canals utilized and controlled the annual overflow and 'Iraq was a land of amazing fertility. Now much of this fertile land lies waste; a large proportion of the flood-waters find their way into huge swamps which form the breeding-ground of countless myriads of malarial mosquitoes. Nevertheless, there are large stretches of rice and cornfields and enormous groves of date-palms.

The *Desert Fringe* needs but little description. The borders are hard, gravelly plains with patches of sand and there is frequently a scarp of 50 or 100 feet in height which marks the commencement of the Euphrates-Tigris plains.

The climate of 'Iraq is characterized by extreme heat in summer (Baghdad has an average of 92.5°F. in August) and a rather unexpectedly cold for the latitude (Baghdad 49° in January). The scanty rainfall, almost entirely in winter, averages about 10 inches in Lower 'Iraq, but is curiously variable from year to year—but definitely insufficient for agriculture. One wonders why the great ancient civilizations flourished in a climate seemingly so far from ideal. There is no doubt, however, that the climate (apart from swampy areas) is healthy, whilst the flood-waters induce amazing returns from the very fertile

Since the twin rivers of 'Iraq are the life-blood of the country, they merit some further attention. The Tigris is the more rapid of the two streams; it is about 1,150 miles long and is navigable for steam craft for over 450 miles from above Baghdad to its entry into the Shatt el-'Arab. Below this point water is not in its distributaries and the sinuous course is only navigable by small craft drawing two or three feet of water. During the War, navigation on the Tigris regained something of its ancient importance: by the end of 1918 nearly 2,000 steamers collected in all over the world were plying on the Tigris. The native fleet include the native cargo boats or 'dhows' and curious bowl-shaped boats peculiar to 'Iraq made of plaited reeds covered with pitch. The Euphrates is a much slower river than the Tigris; its lower course is too tortuous and interrupted by swamps to make it of much value for navigation. The Euphrates, in the past, changed its course repeatedly; the old Hilla channel past the ruins of Babylon became almost dry until high irrigation works forced the water back into its old bed. It begins near the

end of the rainy season, reaching its height about May and ceasing in June.

Important as they were, it is doubtful whether the irrigation channels of ancient 'Iraq were ever other than inundation canals, quickly becoming choked with silt and vegetation if neglected. The existing modern works were planned by Sir William Willcocks for the Ottoman Government, and constructed for that Government by the firm of Sir John Jackson, Ltd. The great Hindiya Barrage was constructed across a channel excavated by the side of the Euphrates and, when complete, the Euphrates was diverted into the channel. The ordinary summer level of the river was raised by about 16 feet 6 inches and the water is conducted

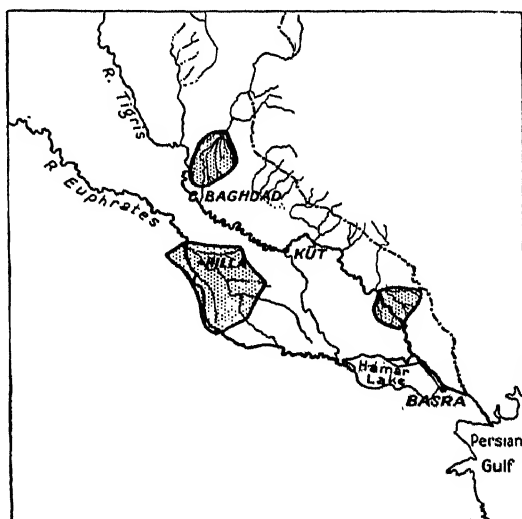


FIG. 58.—Lower 'Iraq, showing the areas to be irrigated according to Buckley's scheme.

through the old Hilla channel to water an extensive tract of rich agricultural land. Another work of importance was the Habbaniya Escape, designed to take the flood-waters of the Euphrates into a large natural depression and thus to prevent the annual flooding of rich land in the Baghdad, Hilla and Babylon districts.

But the works which now exist are but an infinitesimal portion of works which could be carried out. A. B. Buckley, of the Egyptian Ministry of Public Works,<sup>1</sup> proposed in 1919

<sup>1</sup> *Mesopotamia as a Country for Future Development*, Ministry of Public Works (Cairo, 1919).

scheme to irrigate 3,000,000 acres in three areas—the Diyala, Hindiyah and Amara tracts—a scheme to cost £30,000,000 and to be paid for in fifty years. Apart from these ambitious schemes, which the population of the country at present scarcely justifies, there are vast areas which can be cultivated by pump irrigation. The problem of economic cultivation by these means is closely bound up with the supply of cheap oil for fuel. Hence the enormous importance of the oil discoveries at Khanaqin near the Persian frontier (Anglo-Iranian Oil Company) and the strike

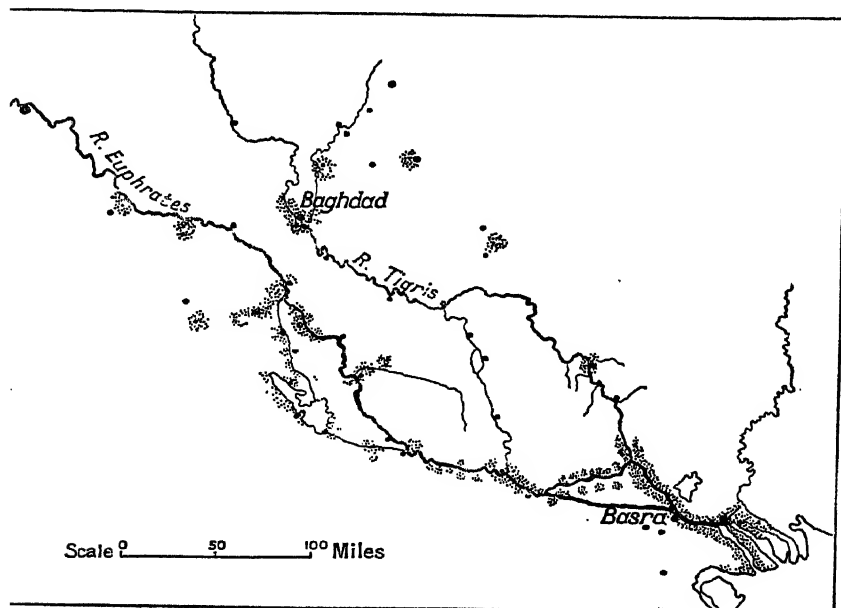


FIG. 59.—Date-cultivation in 'Iraq.

dotted areas indicate date-groves; the larger dots are towns or villages with date gardens adjoining.  
(After Dowson.)

the 'Iraq Petroleum Company at Baba Gurgur near Kirkuk (October 14th, 1927). Irrigation is also carried out by the primitive water lift of buckets and pulleys, whilst in Lower 'Iraq fresh water is sent twice daily into specially constructed canals by the rise of the tide in the Shatt el-'Arab.

**Agriculture.** There are two harvests in 'Iraq—one in April or May of wheat, barley, beans and other winter crops; the other between August and November of rice, maize, etc. At present only the most primitive agricultural implements are generally used.

The most important crop in 'Iraq is the date crop,<sup>1</sup> and it is in 'Iraq and Upper Egypt that the date-palm attains perfection. In Southern 'Iraq there is one continuous date plantation on either side of the rivers, those on each side of the Shatt el-'Arab being especially fine. 'Iraq has been calculated to produce 80 per cent. of the world's dates; the export alone in 1932-33 exceeded 150,000 tons. Later in this book we shall have occasion to refer to the extreme usefulness of all parts of the coconut palm in regions

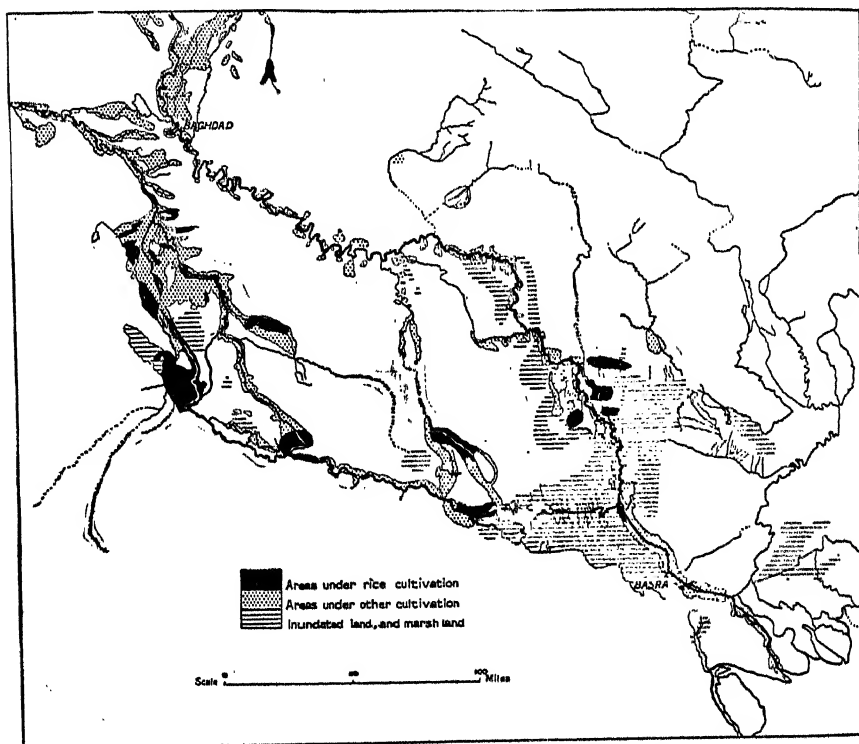


FIG. 60.—The cultivated land of Lower 'Iraq.

like Southern India and Ceylon: in 'Iraq the same is true of the date-palm. The dates themselves are the staple food of the Arabs and may be prepared for food in a great variety of ways. Syrup and vinegar are made from old dates and also a strong spirit ('arak), whilst the date seeds are ground for cattle and sheep food. The terminal bud of the stem is not unlike an almond in flavour but much larger and is eaten as a table delicacy.

<sup>1</sup> V. H. W. Dowson, *Dates and Date Cultivation of the 'Iraq* (Cambridge: Heffer, 1921).

The fronds or leaves are woven into matting and half the population of Southern 'Iraq lives in date-mat houses. A fibre from the outer trunk makes strong rope, whilst the light porous timber is much used in bridge-building and construction work. Basra is the centre of the date trade; only certain varieties are suitable for export and are packed for shipment in wooden boxes. Poorer varieties enter into local trade and into trade with India.

Rice ranks second in importance to dates; the quality is poor but the yield is very large. The paddy fields are usually on the lowest parts of the slopes from the raised river channels to the surrounding swamps. Rice is the main cereal of Lower 'Iraq as wheat and barley are of Upper 'Iraq. In parts of the Mosul area the rainfall is sufficient for wheat grown by dry-farming methods. The wheat is hard, red and of excellent quality, but is grown entirely for home consumption. Maize, millets and sesame are cultivated mainly in Lower 'Iraq.

Cotton is a crop for which there are great possibilities in 'Iraq, especially as it may be possible to cultivate the finer types of Egyptian cotton, but production has recently dropped.

Tobacco is an important crop of the north. Other crops especially important in the Shatt el-'Arab region are opium, hemp, lentils and liquorice root. In the hills of Northern 'Iraq European fruits grow to perfection; further south oranges, mulberries and lemons grow well. 'Iraq has little or no timber, though the hills of Kurdistan and the banks of the Tigris were once well wooded.

On the desert fringes of the south-west and in the plains of Upper 'Iraq nomadic and semi-nomadic Arabs rear camels, horses, donkeys, sheep and goats, and the settled population usually own numerous sheep and goats. The wool obtained from the sheep is of excellent quality, whilst Angora goats are reared in Kurdistan.

**Minerals.** Apart from salt and some poor coal, the mineral importance of 'Iraq centres in oil. There are three oil belts—the eastern belt linked with that of Persia; the Middle Tigris belt, and the Euphrates belt of much less promise.

**Population.** Apart from the Persians, Kurds, Turcomans and others on the borders and a considerable number of Jews in the cities and Indians who are recent arrivals, the population of 'Iraq consists almost entirely of Sunni and Shi'ah Moslem Arabs (over 90 per cent. of the population). Syrian Christians are numerous in Mosul. The principal town is, of course, Baghdad, of Arabian Nights fame. Founded in the eighth century, it was for five centuries the capital of the Moslem world and remains to this day a very sacred city of the Sunni sect. The

famous pontoon bridge across the Tigris links old Baghdad with new Baghdad on the east of the river. It has for centuries been the meeting-place of caravan routes from Syria and Arabia on the one hand and Persia on the other, and apart from its fame as a mart, manufactures silks, woollens, cottons, rugs, pottery, etc. Just as Baghdad is the city *par excellence* of the heart of 'Iraq, so is Basra *par excellence* the port—indeed the

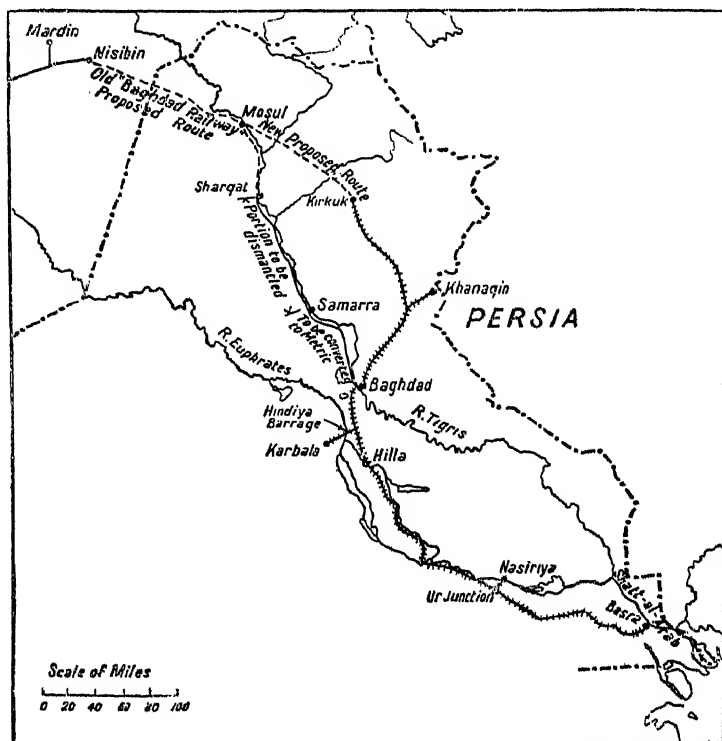


FIG. 61.—The Railways of 'Iraq, 1928.

+++++ Metre gauge railways.  
 ————— Standard gauge railways.

only one possible for ocean-going steamers, being situated some 60 miles up the Shatt el-'Arab. The Date City has an unpleasant climate and is rendered unhealthy by near-by marshes and the sanitation system, but is growing rapidly in population and prosperity.

Mosul is the third city of 'Iraq, the metropolis of the north. Others towns of note are Hilla (near the ruins of Babylon), the



holy cities of Karbala and Najaf; Kurnah 'Amara and Kūt-al-māra of war fame, which is likely to become a great wheat centre.

**Communications.** The river traffic has already been noted, and the railway system is best studied in the light of General Hammond's recent report. One of the chief points in this report is to abandon the old direct route for the Mosul-Baghdad railway, laid as far as Samarra on the broad gauge, and to link Mosul and Baghdad by a northern route passing through much more productive country. Air routes now link Baghdad with

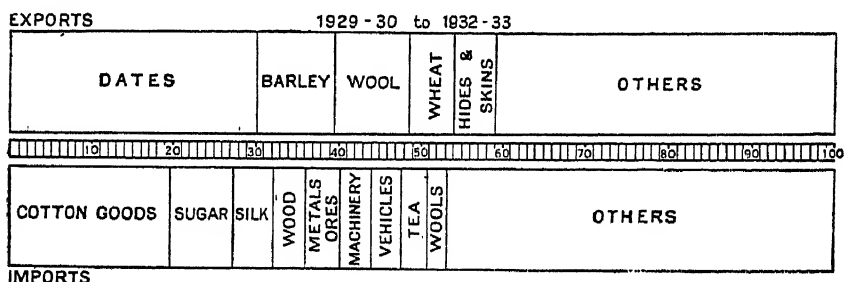


FIG. 62.—The foreign trade of 'Iraq.

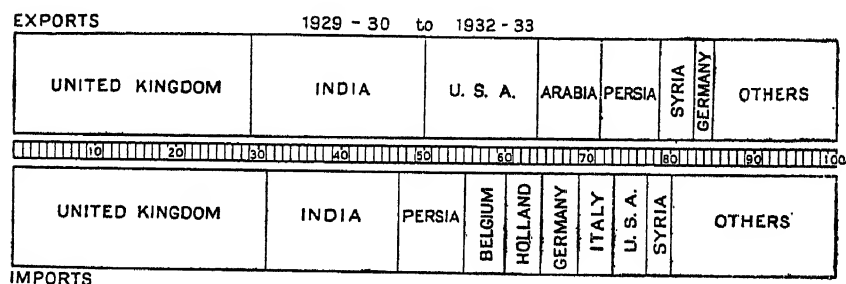


FIG. 63.—The direction of the foreign trade of 'Iraq.

Europe on the one hand, India and Australia on the other via Imperial Airways. There are also services to Moscow and many parts of Persia.

**Foreign Trade.** In the year 1932-33 the total trade of 'Iraq was valued at £10,738,000. Of this imports represent over a half, transit trade a fifth, leaving exports at less than 25 per cent. The large entrepôt trade is mainly with Persia, and in this regard 'Iraq is in competition with Russia on the north. The chief items in the domestic trade of 'Iraq are shown in Figs. 62 and 63.

## CHAPTER III

### THE IRANIAN PLATEAU

**B**ETWEEN the Armenian Knot on the west and the Pamirs on the east there stretches a great plateau occupied by the States of Persia, Afghanistan and Baluchistan. The high northern rim is formed by the Elburz Mountains, overlooking the Caspian Sea, passing eastwards into Alla Dagh, flanked on the north by the Kopet Dagh, then into the Paropamisus Mountains of Afghanistan and the main mass of the Hindu Kush Chain, all overlooking the plains of Russian Turkistan. The southern rim consists of several parallel ranges overlooking successively the Plains of 'Iraq, the Persian Gulf, the Gulf of Oman, the Arabian Sea and the Plains of the Indus.

Baluchistan we shall reserve for consideration under India; both Persia and Afghanistan overlap the plateau and include strips of lowland.

#### IRAN (PERSIA)

Persia is a kingdom with an area of 628,000 square miles—equal to a fifth of Continental United States, or larger than the British Isles, France, Switzerland, Belgium, Holland, and Germany combined. It is 1,400 miles from north-west to south-east and 875 miles from north to south. Yet in this vast tract the population is only about 10,000,000. Until recently Persia was an absolute monarchy, but in 1906 the Shah gave his consent to a Parliament, or Majlis. By 1925 the Majlis had become sufficiently forceful to depose the reigning Shah and his dynasty and to erect a new dynastic house.

The heart of Persia is a great tableland, most of it with an elevation of from 3,000 to 5,000 feet. Except on the east, where the plateau merges imperceptibly into that of Afghanistan and Baluchistan, it is surrounded by walls of mountains, and every route to the heart of Persia involves an arduous mountain journey. The tableland of the interior, besides being walled in by mountains, is itself cut up by lines of mountains with a general trend parallel to that of the boundary ranges. It is only in Eastern Persia that great desert plains are the pre-

dominant topographical feature. The plains and valleys which lie between the ranges of the plateau would be utterly sterile were it not for the water derived from the snows of the mountains.

Along the southern borders of Persia the mountains in general approach close to the sea; the coastal strip is narrow, dry and barren except in a few areas where sufficient water is available to make irrigation of crops possible. The mountains of the northern border are loftier and more imposing, especially the Elburz. Most of the numerous ranges of North-western Persia have peaks rising to 8,000 or 10,000 feet, which dominate the upland valleys whose floors stand 4,000 or 5,000 feet above sea-level. The mountains of Persia culminate in the extinct volcano of Damavand, 19,000 feet. The narrow strip of plain along the shores of the Caspian presents a great contrast to the bleak, sterile mountains and plains of the interior. The rainfall is good, so that the mountain slopes are forested; the humidity is high, and the alluvial soils washed down from the mountains are rich, so that dense vegetation stretches right down to the Caspian. The forests have been cleared over large areas; fruits and field crops thrive, and it is in this region, the most favoured of all Persia, that the mulberry tree and sericulture flourish.

More than half Persia lies in the main basin of inland drainage; in addition the Seistan basin of Afghanistan and Baluchistan drains a considerable tract in the east and Lake Urmia a large area in the west. The north drains to the Caspian, mainly by the Aras or Araxes, Sefid Rud, Gorgan and Artrek Rivers. Only about one-fifth of Persia drains to the Persian Gulf or the Arabian Sea, but of special importance is the Karun, which flows through a fertile plain at the head of the Persian Gulf.

The climate of the interior of Persia is sufficiently distinctive to have given the name 'Iran type' to a widely distributed type of climate—the climate of interior basins at considerable elevations in warm temperate latitudes. In winter the cold is intense, the mean January temperature being but slightly above freezing-point. There are sharp frosts at night, and the temperature may even drop below zero. In summer the skies are cloudless, the air dry and clear, so that the sun's rays are exceedingly powerful. Consequently the plateau, despite its elevation, is very little cooler than the Plains of Iraq. Tehran, for example, has a July average of 85°, and the thermometer may rise to 110°. The scanty rainfall, which rarely, if ever, exceeds an average of 13 or 14 inches on the plateau, falls almost entirely in the winter months. But even in winter the

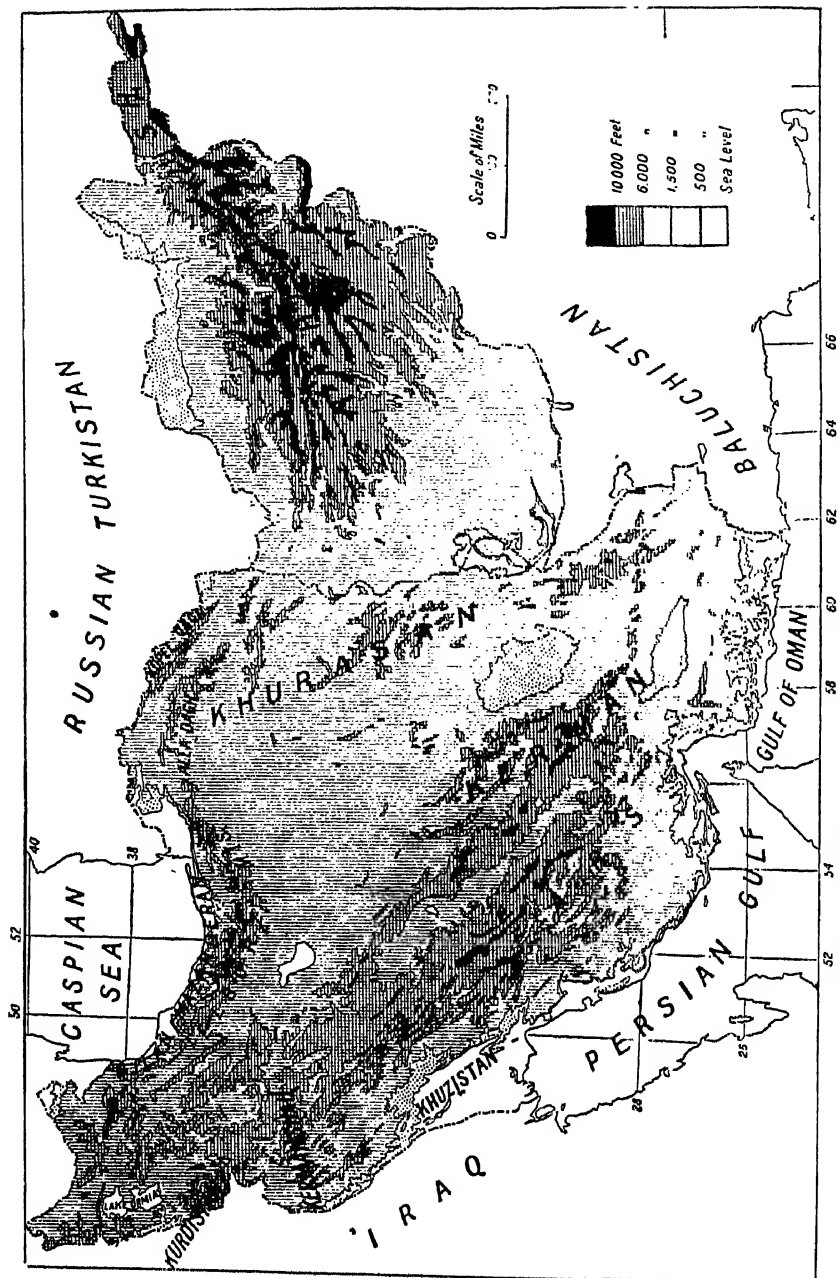


Fig. 64.—The Iranian Plateau of Persia and Afghanistan, showing the physical features.

ather is normally fine and clear, only slightly less so than in nmer. The precipitation, mainly in the form of snow, is turally greatest on the mountains, and the snow provides ter for irrigation when it melts in spring. Places in the lleys even near mountains have only a very low rainfall ehran, 9.0 inches ; Isfahan, 3.6), and on the open plains the dity is extreme. ' The salt swamps, in which the few streams at succeed in travelling so far from the mountains lose them- ves, are frozen in winter, but in summer the heat in the ighbourhood is intolerable. Very violent winds, carrying uds of salt dust, complete the picture of irremediable desert ' endrew).

A very different state of affairs is found on the northern pes of the Elburz, where the heavy rainfall, mainly in winter m the depressions which develop over the Caspian Sea, tirely changes the character of the climate.

The population of Persia is estimated at about 10,000,000, which probably 3,000,000 are nomadic. The nomads include abs, Turks, Kurds, Leks, Baluchis and Lurs. Of the settled pulation the vast majority are Mahommedans of the Shi'ah t. The influence of topography on the distribution of popu- ion is very marked ; the lines of towns and villages follow e trend of the mountains, their position actually being deter- ned by the availability of water from the mountain streams. e largest towns are Tehran, 350,000 (1930), Tabriz, Isfahan shed and Resht. There is little doubt that the population of rsia to-day is far below what it has been in times past. The crease, in face of a trying but healthy climate, is attributed war and pestilence, as well as to social customs, such as early rriage. Above all, Persia needs man-power for development, d an increase in population is a prime national need.

Agriculture is, broadly speaking, the mainstay of Persian e. But with the exception of the Caspian provinces practically e whole country depends on irrigation. Hence to the traveller rsia appears as a land of small gardens or farms separated vast tracts which, except in spring, present an aspect of relieved brown desolation. The system of irrigation in general e is an interesting but very expensive one. A well is sunk the foot of the mountains until water is reached ; the water then conducted by a tunnel or canal (' qanats ' or ' karez ', they are called in Baluchistan) to the area of level land to be gated. There is little doubt that modern irrigation works, ring the flood-waters of spring, could transform many of : tracts at present completely arid and sterile into flourishing tivated land. It is interesting to note that under Persian

law any person who brings barren land under cultivation is legally the owner of it. The farming community of Persia works mainly in village-units, with the village headman supervising the work of all. A three-field system is adopted: one field being planted with wheat, rye, opium or other crops sown in autumn and harvested in summer; another field with maize, peas, rice or other crops sown in spring and harvested in autumn; the third field is left fallow.

Wheat, barley and millets are grown throughout the country, but not oats or rye and only a little maize. Wheat is produced considerably in excess of the needs of the populace and is exported; the barley is grown mainly for horses. Rice is a very important crop in the provinces of Gilan (producing about 80 per cent. of the whole) and all along the Caspian littoral. Probably 300,000 acres are under rice; the grain enters into every meal throughout Persia, and there is still a surplus available for export, especially to Russia. Sugar-cane could be grown in Persia in the same regions as the rice, and beet elsewhere, but actually Persia imports most of her sugar requirements. Tobacco is widely cultivated and is of excellent quality; domestic consumption is high, so that the surplus available for export is small. Opium is a crop which merits special attention; for home consumption it has been cultivated since very early times, but it is only within the last half-century that it has become a staple article of export. The exports reached record levels recently, e.g. in 1926-27, of 96,000,000 krans, or roughly £2,000,000, but have dropped greatly since. Roughly three-quarters is said to find its way to China, though the finest is exported to London. Whilst the Persian Government has definitely stated that it would favour the reduction of opium cultivation, actually that cultivation has got at present a strangle-hold, for there is no other equally remunerative crop to replace it in the rural economy. Cotton grows in most parts of Persia up to 5,000 feet, and before the War Persia supplied up to 200,000 bales to Russia. But the Persian cotton is coarse and short-stapled. At present Persia imports yarn largely from India for her carpet industry, whilst cotton goods and yarn stand at the head of Persian imports. Whilst it is doubtful whether the plateau could grow good long-stapled cotton, Persia has excellent land suitable for American and possibly for Egyptian in the fragment of the Tigris lowland (Khuzistan) which lies within her borders. Persia has a climate well suited to fruits, both Mediterranean and tropical—including the dates of the Persian Gulf littoral. The vine grows well; wine and strong spirits are manufactured. As in India, the

tivation of indigo, henna, and madder has suffered from the competition of aniline dyes.

Transport animals—horses, mules, donkeys and camels—numerous in Persia, for they still form the chief means of transport in the country. The dry hill pastures are suitable for sheep and goats rather than cattle, and there is a considerable export of wool, in addition to the large quantities used in local manufactures of cloths, carpets and shawls. There is considerable export of hides and skins, roughly tanned at Isfahan and other centres.

Sericulture in Persia is interesting in that it was the silk industry of Persia which attracted most attention in Europe. The industry was virtually killed by disease about fifty years ago. The import of eggs from Turkey and Russia resulted in a revival from 1890 onwards and the production reached 100,000 lb. of raw silk before the War, which again crippled the industry. Eighty-eight per cent. was produced in Gilan, and three-quarters went to France, Italy, Russia and Turkey. The Persian Gulf fisheries are important, and before the War the annual catch exceeded 10,000 tons, the bulk being exported to Russia. The produce, including sturgeon and caviare, is exported to Europe via Russia—a procedure necessitated by the need of labelling caviare as 'genuine Russian'. The strained relations between the Soviet and Persia killed the fishing industry for a time.

The forest wealth of timber lies mainly in the forests on the slopes of the Elburz in the provinces of Mazanderan and Gilan. The trees are mainly deciduous hardwoods. Timber also occurs in the province of Fars and in the Kurdistan section. Gum tragacanth is collected from a thorny bush which grows especially in the hill country between Kerman and Kermanshah. Gum arabic, gum ammoniac, and other gums, including that known as asafoetida (extracted from a desert plant growing in Turan), are also obtained, and liquorice root grows wild almost everywhere.

Geologically <sup>1</sup> Persia lies in the great Alpine fold belt. In the plains horizontal or slightly folded sandstones, limestones, and chalks of Tertiary and Cretaceous age predominate; the older ranges are highly folded, often over-folded, and have cores of old rocks, gneisses and granites. There is much igneous material, especially in the north-west. In the deserts the solid

<sup>1</sup> A. F. Stahl, 'Persien,' *Handb. d. verg. Geol.*, V. 6, n.d. (1911); G. E. Grim, 'Geology of the Persian Gulf' and 'Geology of Parts of the Persian Provinces of Fars, Kerman and Laristan,' *Mem. Geol. Surv. Persia*, Vol. XXXIV, 1908, and Vol. XLVIII, 1924.

geology is masked by sands and other superficial deposits. Although numerous minerals are known to occur in Persia, they are scarcely touched owing to transport difficulties, and their real value is unknown. Coal and iron occur in the north-west, especially in Tehran Province, but proposals to make steel for rails have been abandoned and a State-owned colliery has not proved successful. The one mineral which has been developed is oil. Surface shows had long been known, but it was only after seven years of experimental drilling by modern machinery that W. K. D'Arcy was rewarded by striking the Maidan-i-Naphtun<sup>1</sup> field in 1908. The Anglo-Iranian Oil Company was formed in 1909, after which the field and the record of the Company's operations is one of continual expansion. The Anglo-Iranian has attracted an unusual amount of interest because it is one of the very few companies in which the British Government holds shares—to the extent of £2,000,000. The purchase of shares was undertaken to safeguard supplies of oil fuel for the British Navy. As Moustafa Khan Fatch has stated in his valuable book, *The Economic Position of Persia*<sup>2</sup>: 'The Persian oil industry has brought blessings on two nations, i.e. the British and the Persians.' The royalties from A.I.O.C. oil have constituted in recent years between 10 and 20 per cent. of the total revenue of the Persian Government. The Company

#### ANGLO-IRANIAN OIL COMPANY'S RECORD.<sup>3</sup>

Year ending March 31. (Calendar years after 1928.)	Output in Tons.	Royalties paid to the Persian Government.
1913 . . . . .	80,800	£
1914 . . . . .	273,635	
1915 . . . . .	375,977	
1916 . . . . .	449,394	
1917 . . . . .	644,074	
1918 . . . . .	897,402	1,325,552
1919 . . . . .	1,106,415	
1920 . . . . .	1,385,301	
1921 . . . . .	1,743,557	468,718
1922 . . . . .	2,327,221	585,289
1923 . . . . .	2,959,028	624,200
1924 . . . . .	3,714,216	566,744
1925 . . . . .	4,333,933	327,523
1926 . . . . .	4,556,157	728,778
1927 . . . . .	5,107,081	1,389,612
1928 . . . . .	5,357,800	596,855
1929 . . . . .	5,710,000	1,250,000
1930 . . . . .	5,850,000	payments on
1931 . . . . .	5,750,000	new basis
1932 . . . . .	6,500,000	
1933 . . . . .	7,087,000	
1934 . . . . .	est. 7,500,000	

<sup>1</sup> The Maidan-i-Naphtun field is now called Maidan-i-Sulaiman.

<sup>2</sup> P. S. King and Son, 1926. This book has been freely used in writing this section on Persia.

<sup>3</sup> Formerly called Anglo-Persian.



nds several millions sterling per year in Persia ; employs more than 25,000 Persians ; has built towns equipped with substantial dwellings, schools, hospitals, and public buildings ; has constructed fine roads and railways in a part of the country formerly almost uninhabited.<sup>1</sup>

It is at the same time an open secret that the Company could any time treble its present output, and in addition has other oil tracts awaiting complete testing. A pipe-line 145 miles long connects the field with the refinery on the island of Abadan. It is believed that other petroliferous areas exist in Northern Persia.

Persia is one of the happy countries to which factory industry—apart from oil—have not yet penetrated. Industry remains a village industry : it is ' local, not national, and the various craftsmen transfer their knowledge to apprentices from generation to another. These craftsmen manufacture goods for their livelihood, but many of them develop remarkable skill in handicraft, and show an intuitive love of beauty and achievement. The trade is greatly localized, because of the cheapness, the particular neighbourhood of the primary substance, and the traditional craftsmanship which generally remains in one district ; in consequence every town or district can boast its speciality.'

Persian carpets are world famous ; the men buy the wool and get it dyed, the women and children do the work. Even a skilled woman can work only one square foot in thirty hours ; hence high cost. The carpets have suffered from the introduction of aniline dyes ; colours and patterns have become standardized.

The industry has, however, gained from improved communications with Europe, but suffers from Indian, Turkish, and Chinese competition. The beautiful old silk carpets are now only made except to order. Apart from oil, carpets form Persia's leading export (14 per cent. of the total in 1923-24 ; 17 per cent. in 1928-29), to the value of £2,000,000 to £3,500,000 annually in recent years. In addition to carpets, woollen felts, woollen shawls, and silks are made, but the industries, especially the latter, have suffered extremely from the competition of imported factory-made goods. Persia is scarcely ready for the establishment of home factory industries ; those which have been attempted have not proved successful except for some spinning works at Tabriz. Communications are first of all Persia's great need. Turning to this all-important question, there exist in Persia only about 470 miles of railways. A line runs from the Russian frontier, from Julfa to Tabriz, with a branch from Sofian to Lake Urmia. See J. W. Williamson, *In a Persian Oilfield* (London : Benn, 1927).

Urmia ; it was built by Russia during the occupation of 1909-18, but is now in bad repair. In 1928 it took the weekly train about eleven hours to go about 125 miles. A line—part of the Indian North-Western System—runs from the Baluchistan frontier to Duzdap.<sup>1</sup> Persia's great ambition is a main north to south line from the new port of Bandar Shapur on the inlet of Khur Musa, to be constructed via Hamadan to Tehran and the Caspian. A rough estimate places the cost at £40,000,000.<sup>2</sup> Persia has

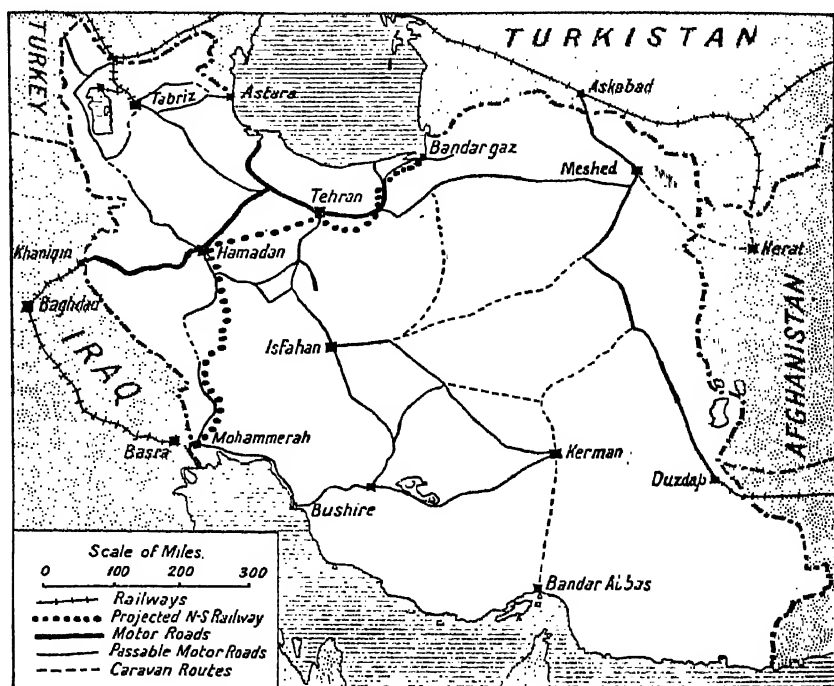


FIG. 65.—The main routes of Persia.

about 600 miles of road,—by courtesy called metalled<sup>3</sup>—stones loosely thrown on the surface,—about 1,500 miles of gravel-surfaced roads, and a further 3,000 miles of unmetalled roads, classed as passable for motors for most of the year. The position of these roads is shown in Fig. 65. Notwithstanding the road conditions, the motor-lorry is replacing the expensive, uncertain and slow caravan<sup>4</sup> on all possible routes. In 1924-25 there

<sup>1</sup> Temporarily disused.

<sup>2</sup> Under construction by German and American firms at both north and south ends.

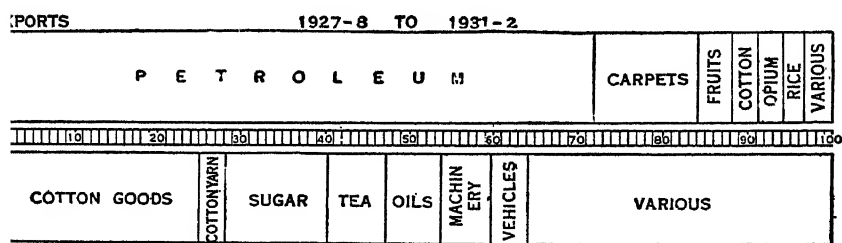
<sup>3</sup> Rapidly being improved.

<sup>4</sup> A caravan travels 15 to 25 miles per day.

he imported 529 motor-cars and 103 motor-lorries; two years  
er, in 1926-27, 1,330 cars and 967 motor-lorries. It is the  
y lorry with a capacity of 4 to 5 tons which is most suitable,  
l the high-powered American car.

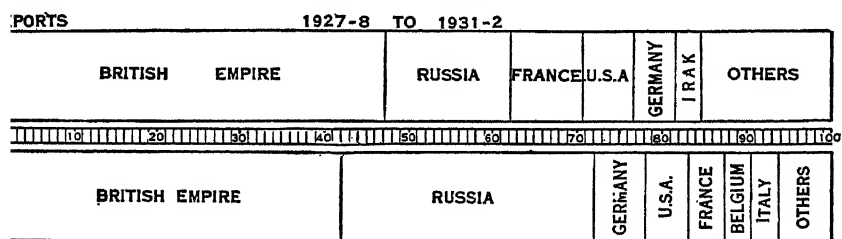
It will be seen that there are three main lines of entry into  
sia at present :

- (1) From Russia to Tabriz.
- (2) From Baluchistan to Duzdap.
- (3) From Baghdad to railhead on the frontier and thence  
by regular motor service to Tehran, the capital.  
Through rates are quoted for passengers from Haifa  
to Tehran by Damascus and Baghdad.



PORTS

FIG. 66.—The foreign trade of Persia.



PORTS

FIG. 67.—The direction of the foreign trade of Persia.

The Russians run a regular aeroplane service to Tehran  
n Moscow via Pahlevi on the Caspian, as well as from Tehran  
Bushire (on the Gulf) and Qurartu on the 'Iraq frontier.  
Persia's economic development in the near future is depen-  
t on three main factors: transport, the improvement and  
ension of irrigation, and capital. In fact, capital is the  
me necessity; this Persia can secure by a liberal policy  
wards foreign capital. The Anglo-Iranian Oil Company affords  
agnificent example of the benefits which foreign capital can  
fer on Persia.

In fact, the royalties derived from Anglo-Iranian oil have

much to do with the present comparative prosperity of Persia. In value the oil represents between 60 and 65 per cent. of the country's exports. Some Persians are apt to ignore this export and say that it does not really represent Persian trade; they bemoan the fact that Persian imports are in excess of her exports (excluding oil). But actually it is the millions spent annually by the Company in Persia which make possible the purchase of these imports.

In the foreign trade of Persia the high place taken by sugar and tea amongst the imports should be noted, since both these commodities might be produced within the country. Cotton tissues account for no less than 33 per cent. of the imports; Lancashire occupies first place as a supplier of bleached and prints, but India of the grey and also thread. Russia is an important supplier also.

#### REFERENCES

There are numerous books of travel on Persia, but few geographical works. Moustafa Khan Fatch's book quoted above is especially valuable; the information may be supplemented from the Reports published from time to time by the Department of Overseas Trade (Great Britain) or the Reports published by the United States Department of Commerce and Industries in the journal *Commerce Reports*.

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#### AFGHANISTAN

Just in the region where India's mountain rampart is weakest, it happens that the territory of Asiatic Russia approaches most closely the borders of India. In the latter half of the nineteenth century, when Imperial Russia was pushing her influence and extending her territorial rights further and further southwards towards the borders of India, only the territory of Afghanistan intervened to prevent the clash with the British spheres of influence. At the present time the proud, independent kingdom lies between Soviet Russia and British India, and may be destined to play an important part in preserving the peace of Asia. The position of Afghanistan may be broadly indicated by saying that it is perched high up on the broad top of India's mountain wall, overlooking the rich fertile plains of India on the one hand and the important plains of Asiatic Russia on the other. The history of Afghanistan is the history of a typical buffer State; of the numerous invaders who have

tacked India by land the majority have struck from the north-east by way of Afghanistan. Although Alexander the Great did not use the Khyber Pass route, he included Afghanistan in his sweeping conquests between 334 B.C. and 323 B.C.

Afghanistan has an area variously estimated at between 3,000 and 270,000 square miles, or more than twice the size of the whole of the British Isles. The boundaries of the country have been defined by a series of treaties; that between Afghanistan and India in 1893; that with Persia was demarcated in 1903-1905; that with Russia dates from 1895. The treaty between Great Britain and Afghanistan signed at Kabul on November 22nd, 1921, marked the commencement of a new era. It closed the phase of Afghanistan as a hermit nation, entirely forbidden to foreigners unless specially bidden to carry out some work where technical knowledge was required. It recognizes the complete independence of Afghanistan, and agrees to an interchange of diplomatic representatives. The recognition of Afghanistan by Germany, France, Italy, Soviet Russia, Turkey and Persia quickly followed, and each of these nations has Consulates at Kabul. An Anglo-Afghan Trade Convention was ratified in 1923, and the Germans have been particularly active in flooding Kabul bazaars with German goods.

Except for a strip of the Plain of Turkistan on the north, the whole of Afghanistan is occupied by lofty mountains and elevated plateaus. M. Raymond Furon, to whom is due the best account of the geography of the country,<sup>1</sup> distinguishes three physiographic regions:

(1) Afghan Turkistan, or rather Bactria, is a low plain situated between the valley of the Oxus and the mountainous massif to the south. The rivers which rise in these mountains empty themselves in the sand before reaching the Oxus. Former irrigation works have been deserted and the tract is unhealthy and very sparsely inhabited, with Mazar-i-Sharif as the principal town.

(2) The Hindu Kush constitute a mountain complex, difficult access, entirely barren and uninhabited. The average height of the mountains is over 15,000 feet and the peaks, which are always snow-covered, exceed 18,000 feet. The Passes of Nuksan and Khawak afford communication with Badakhshan; the Pass Ak-Robat and Dendan-Shikan are used by the routes between Kabul and Mazar-i-Sharif.

(3) Badakhshan occupies the north-east of Afghanistan, to the east of Turkistan. It is a beautiful region, including the Pamirs, limited on the north by the Upper Oxus (or Amu-

<sup>1</sup> *L'Afghanistan* (Paris: Blanchard, 1926).

Darya) and completely isolated on the south by the main chain of the Hindu Kush. Except in the low-lying regions of the west the climate is healthy. Some parts are forested, the valleys are cultivated or inhabited by shepherds with their flocks.

(4) Kabulistan is a convenient name for the series of alluvial plains which occupy the region round the capital, south of the Hindu Kush. Lying between 5,000 and 6,000 feet above sea-level, the plains are watered by the Kabul River and its tributaries, and constitute the richest and most densely populated part of Afghanistan. It is an agricultural region, surrounded by wild lofty mountains, with a healthy climate except where there are marshes.

(5) Hazara is a mountainous region occupying the whole of the centre of Afghanistan. It is comparatively well watered,

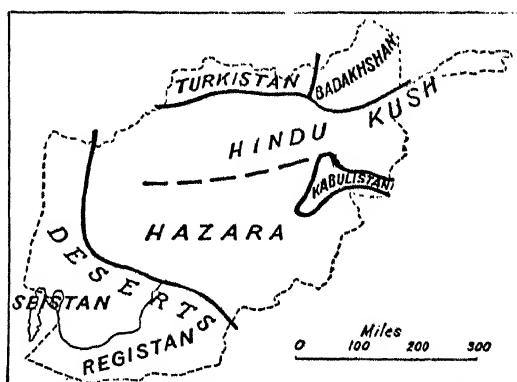


FIG. 68.—The natural regions of Afghanistan (based on the descriptions of Furon).

but sparsely populated. Inhabited by immigrant Mongols, this region is still little known.

(6) The deserts of the south and west cover nearly a quarter of the country. The valley of the Helmand forms a green ribbon of fertile land separating Seistan on the west from Registan on the east. These torrid sand-covered wastes are traversed with difficulty by nomadic Baluchis with their camel caravans, otherwise the regions are almost uninhabitable. Formerly the south-west was irrigated and prosperous, but drifting sand has completed the work of invading armies of the Middle Ages. It would seem that Seistan is becoming drier, for the great lakes Hamun-i-Helmand and Gaud-i-Zirreh are becoming smaller.

With the exception of water collected by the river Kabul and its tributaries, which belong to the Indus system, all the rain falling in Afghanistan drains into inland basins. The most

important watercourses are the Amu-Darya (or Oxus), which for 480 miles forms the northern frontier; the Murghab, which for a course of 360 miles loses itself in the Oasis of Merv; the Hari-Rud, which waters the fertile plain of Herat before disappearing in the Oasis of Tejend. The Helmand is the longest river entirely in Afghanistan. After a course of over 600 miles across Hazara and the south-western deserts it empties into the marshy lake known as Hamun-i-Helmand, in the centre of the Helmand Basin. The upper valley of the Murghab and the Hari-Rud, as well as nearly the whole of the Helmand Valley, are in general cultivated; but most important of all are the plains of Kabul irrigated by the waters of the Kabul River. Nearly all the smaller rivers of Afghanistan are dry watercourses for three-quarters of the year.

Little is known of the mineral resources of Afghanistan.<sup>1</sup> Deposits of salt of Tertiary age, sufficient for the home consumption, occur in Badakhshan, Turkistan and Herat; iron-ore exists in Afghanistan, copper in the Hindu Kush, and lead in Hazara. Lapis lazuli and rubies are found in Badakhshan.

In general the climate of Afghanistan is very dry, sunny and characterized by great extremes of temperature. The higher regions, above 3,000 feet and including Kabul and Peshawar and most of Hazara, have very cold winters, when the thermometer drops below zero, and hot summers with day temperatures reaching over 100° F. Snow falls in January and February, followed by rain in March and April, the rest of the year being almost rainless. The total precipitation rarely exceeds 15 inches, 75 per cent. falling between January and April, when snow and melting snow give rise to numerous short-lived torrents. Habitations and cultivation cease at about 8,000 feet, though barley will ripen up to about 9,000 feet. The regions below 3,000 feet, which include Turkistan in the north, the area round Kandahar in the east and the deserts of the south and west, have milder winters and very hot summers. For three months the day temperature is liable to exceed 110°. The rainfall, which comes in winter, does not normally exceed 2 or 3 inches, and cultivation is limited to oases and the larger river valleys, where dates, pomegranates and sugar-cane are the leading crops.

The population of Afghanistan is estimated to be about 3,000,000. There are five main racial stocks:

The *Pathans* are a white race calling themselves 'Beni Ismael', since they claim descent from the ten lost tribes of

<sup>1</sup> The best summary of the geology is given by Trinkler, with a geological map. See note at end of Chapter.

Israel who were taken into captivity by Nebuchadnezzar. They occupy the tract along the Indian frontier, and are divided into numerous tribes, such as Waziris, Afridis, and Mangals, notorious for their turbulence.

The *Hazaras*, who occupy the heart of the country, are Mongols with yellow skin and sparse beards, and are relics of the invasion of Ghengis Khan. They are peaceful, courageous agriculturists and pastoralists. The ranks of servants and labourers throughout the country are largely recruited from the Hazaras.

The *Turcomans*, of Turkish origin, inhabit Turkistan. Many of them are camel drivers and vendors of horses.

The *Tadjiks*, of Persian origin, occupy the west of the country, including Herat.

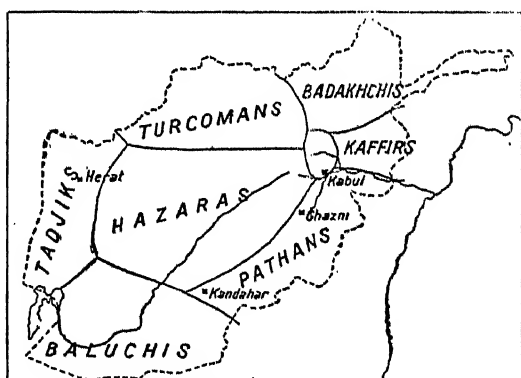


FIG. 69.—The races of Afghanistan.

The *Kaffirs* inhabit the mountains north-east of Kabul, and are a pale-skinned, blonde-haired race only recently converted to Islam.

In addition to these five races, nomadic Baluchis wander over the southern deserts, and Badakhchis occupy the north-east. The population in the Kabul plains is very mixed, and now includes several thousand Indian traders. Nearly all Afghans, except Pathans, speak Persian in addition to their own language. The population of Afghanistan, apart from the nomadic groups, is concentrated in the valleys, where the alluvial stretches are sufficiently large and well enough watered for the cultivation of the staple crops—wheat and barley. Isolated houses or farms are rare; they are grouped together in high-walled villages for safety. Few of the valleys are rich enough to support a town of any size, the principal exceptions being Kabul (150,000),



hazni (15,000), Kandahar (20,000), Mazar-i-Sharif (20,000) and Herat. The latter city, situated in a fertile plain, with formerly over 100,000 inhabitants, has been several times ravaged by invaders, and has fallen into decay.

The history of Afghanistan is pre-eminently the history of a typical buffer State. Dominated by Persia under Cyrus in the fifth century before Christ and afterwards by Alexander the Great, in the two thousand years which followed Afghanistan at various times formed part of the domains of the Chinese, Arabs, Turks, Mongols, and Persians, as well as being warred against by other nations, such as Russia in the nineteenth century. The modern period may be said to begin with the Anglo-Afghan War of 1879. In September of that year an English mission was assassinated and a month later an English army occupied Kabul. The throne was given to Abdour Ahman Khan, who reigned until 1901, occupying his life in consolidating his kingdom and pacifying it. He was certainly a great king, and he may be said to have founded the unity of Afghanistan. Twice attacked by Russia, some territory on the north was lost to that nation during his reign. From 1901 to 1919 his son Habib Ullah Khan held the throne. Though Afghanistan remained a hermit kingdom, foreigners were introduced from time to time to carry out the construction of certain works. During the Great War, despite the overtures of Germany and the action of Turkey, the other great Mahommedan nation, Afghanistan remained neutral and loyal to her promises to Great Britain. The accession of Aman Ullah Khan in 1919 was followed by a temporary rupture with Great Britain before the new era, already mentioned, was inaugurated. Until 1922 an absolute monarchy, Afghanistan is now a constitutional monarchy with Legislative and State Assemblies, and a Cabinet presided over by the King himself. The title of King was adopted by the Amir in 1926. Free primary and secondary education has been arranged, and a number of colleges exist in Kabul—notably the Military College and Arts College. There is a small standing army, but the King can call upon large numbers of well-armed tribesmen in time of war.

So rapid are the changes now taking place in Afghanistan that it is difficult to write a general account of the people which shall be generally applicable. The attempts of King Aman Ullah Khan to westernize his people in face of hostility resulted in his deposition, followed by the assassination of his successor (1933). One immediate result is a country

suffering from severe indigestion. In the words of M. Furon, penned in 1926: 'On trouve actuellement un pays en retard, où se heurtent deux civilisations l'orientale et l'occidentale; pas encore de routes et déjà des camions de sept tonnes, des avions et pas de techniciens, un Emir aux idées très modernes gouvernant une population indifférente ou rétive, un grand nombre d'étrangers attirés brusquement dans un pays totalement interdite il y a cinq ans.'

The national dress of the Afghan men comprises baggy trousers, a loose shirt worn outside, a vest, a girdle and shoes with turned-up toes. The usual head-dress is a turban, white or black, but a low fez cap is worn in the towns. Many of the older men wear a full beard—especially the mullahs or priests—which is not infrequently dyed red with henna. No good Mahommedan completely shaves the upper lip and a small moustache is left by all. Indoors, the Afghan women wear loose trousers, a mantle with long sleeves, stockings and sandals, whilst a veil covers the hair. When going out a sack-like garment—white or black or blue—is thrown over the head and reaches to the ankles. A small lace-covered window enables the wearer to see but not to be seen. In the country the women are often unveiled, and in Kabul European fashions are beginning to appear. The Afghans, like all Mahommedans, are permitted more than one wife, but the privilege is only exercised by the rich. Afghan houses exhibit to a remarkable degree the influence of geographical and social factors. As in most dry countries each man's house is his water-butt, and on the flat roof the precious rainfall is collected. Of recent years the ubiquitous corrugated iron has appeared and penthouse roofs are increasing in number. Mud and crude bricks are the building materials. The influence of religion is seen in the separation of each house into the men's quarters and the women's quarters, often on opposite sides of a small central court; and in the absence of windows except those opening out on the court. In the poorer houses—that is, in the majority—the men's and women's quarters are each reduced to a single room. Except for a prayer rug, of furniture there is none except in the houses of the rich, who sleep on a low table over a charcoal stove in winter.

The food of the Afghans consists of thin, flat cakes of wheat and barley; fruit; some rice amongst the rich, and occasionally well-cooked meat (beef or mutton). Over-indulgence in fruit results in various diseases. Alcoholic liquors are strictly forbidden and water is the usual drink, though green tea is widely used.

The flocks of sheep constitute the principal wealth of Afghanistan. The nomads drive their sheep from pasture to pasture, moving northwards into the mountains with the approach of summer. The fat-tailed sheep is a native of Afghanistan, and characterized by the immense weight and size of its tail, caused by a development of masses of fat, forming stores of nourishment which are drawn upon in winter or when fodder is scarce. These sheep furnish the principal animal foodstuffs,



FIG. 70.—The routes of Afghanistan.

The plain lines are motor-roads or roads on which wheeled traffic is possible; the lightly dotted lines are mountain tracks. Passes across the Hindu Kush: 1 = Dendan-Shikan; 2 = Ak Robat; 3 = Khyber; 4 = Khawak. It will be noticed that railways approach the frontiers of Afghanistan in three points—one from Russian Turkistan, one from Baluchistan, one from India via Peshawar. A motor road from Kabul to Mazar-i-Sharif was opened in 1933 and another from Mazar-i-Sharif to Herat.

The grease of the tail being used as a substitute for butter. The wool and skins provide material for the native clothing, and also furnish one of the chief exports. The manufacture of 'postins', or sheepskin-coats, is an important industry.

Mention has already been made of the concentration of agriculture in the irrigated valleys. Irrigation is by means of wells, small streams and 'karez'. Two harvests are usual: wheat, barley and some peas form a winter crop grown in

autumn and reaped in early summer ; millet, maize and sometimes rice are summer crops. In the rich plains of Kabul a great variety of fruit is grown. In the lower regions (below 2,000 feet) one meets such characteristic Mediterranean fruits as oranges, figs, grenadines, as well as date-palms and sugarcane.

In Kabul are several State-owned factories for the manufacture of cloth, soap, arms and boots, especially for the army. Native arts and crafts are not very noteworthy.

The camel and the ass, to a less extent the pack-horse and ox, are the normal means for the transport of goods. A feature of the country is the walled caravanserai, found at intervals along the main routes, with a guardian who provides food for

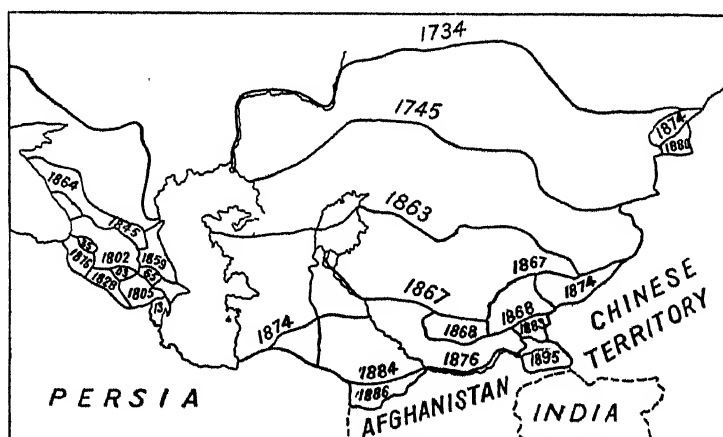


FIG. 71.—Russian expansion in the eighteenth and nineteenth centuries against the northern frontier of Afghanistan.

man and beast. Bullock-carts and motors can use certain roads, at least in summer—Peshawar to Kabul; Kabul to Ghazni, Kandahar and Herat, and Kabul to Bamian.

The foreign trade of Afghanistan is almost entirely with India via Peshawar and with Russian Turkistan. No statistics exist of the total trade ; only of that to and from India. Imports from India averaged between £1,000,000 and £1,500,000 in 1920 to 1925 ; exports about £1,000,000. Imports include cotton goods, dyes, hardware and various small manufactured goods, and sewing-machines ; exports include sheep-skins, wood, fruit and vegetables.

In addition to the works already quoted, an interesting and well-illustrated account of Afghanistan is given by Emil Trinkler : *Quer durch Afghanistan nach Indien* (Berlin : 1925). This has

recently been translated into English by B. K. Featherstone: *Through the Heart of Afghanistan* (London: Faber and Gwyer, 1928). Dr. Trinkler has also given his scientific observations an excellent summary of the geography of the country in *Afghanistan: eine Landeskundliche Studie, Ergänzungsheft nr 16 zu Petermanns Mittheilungen*, 1928. The latter work has a good bibliography; it is quite different in treatment from Furon's book, to which it is complementary.

For details of physical geography and geology, reference may be made to Burrard and Hayden's *Geography and Geology of the Himalayas*, 1908, Part III.

## CHAPTER IV

### THE INDIAN EMPIRE

**I**ntroduction. India is often referred to, with ample justification, as a vast 'sub-continent'. With an area of 1,800,000 square miles, the Indian Empire rivals in size the whole of Europe, excluding Russia (1,950,000 square miles). With a population of 353,000,000 souls it has roughly two and a half times the number of people in the whole North American Continent. From east to west the Indian Empire stretches for 2,500 miles—a ninth of the way round the globe—and from north to south 2,000 miles. If any further justification is needed for the title of sub-continent, it is to be found in the comparative isolation of India—cut off from the remainder of Asia by a mountain wall which is without a rival for loftiness in the world. In this respect alone India is more distinct from the remainder of Asia than is the continent of Europe, which is simply a western peninsula of the main Asiatic mass.

India lies entirely to the north of the Equator. The southernmost point of the mainland, Cape Comorin, is in  $8^{\circ}$  N., the northern frontier reaches  $37^{\circ}$  N. Thus the Tropic of Cancer passes through the heart of India, so that roughly half of India lies outside the Tropics, in the Temperate Zone. It is perhaps but rarely that one realizes the whole of the Indus Plains and practically the whole of the Ganges Plains lie outside the Tropics. We always think of India as essentially a tropical country. And rightly so, for the whole area within the mountain wall must be considered as a unit, with a common type of climate throughout, that of the tropical monsoon.

In longitude, the Indian Empire stretches from  $61^{\circ}$  E. to  $101^{\circ}$  E., with a central meridian of  $80^{\circ}$  E. passing almost through Jubbulpore and Madras and  $90^{\circ}$  E. through the Ganges Delta. India has 6,000 miles of land frontier; 5,000 miles of sea frontier. The whole of India—with the exception of Burma and the city of Calcutta—takes its time (Standard or Railway time) from the meridian of  $82^{\circ} 30'$ , which is  $5\frac{1}{2}$  hours ahead of Greenwich time.

There are three parts of India which lie outside the mountain barrier—the unimportant dry plateau of Baluchistan, the cold

ateau of northern Kashmir (part of the plateau of Tibet) and the large, important and fertile land of Burma. In many ways Burma is quite distinct from the rest of the Indian Empire; the liaison is in the main a political one, hence the frequent distinction between 'India proper' and Burma. Two areas lying within the mountain barrier do not form part of India—the dependent State of Nepal and the island of Ceylon.

More will be said later about the political organization of India, but it must be noted at once that there is a twofold division into British India and Native States. British India covers nearly 1,100,000 square miles, with a population of

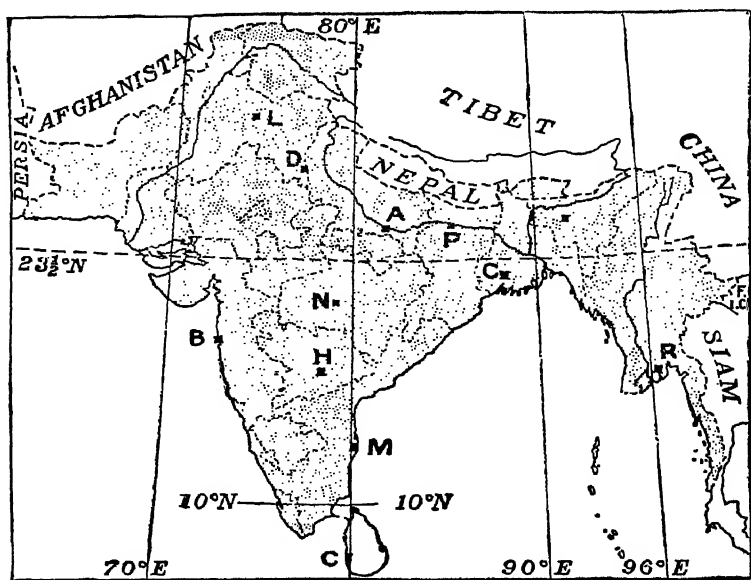


FIG. 72.—The position of India.

2,000,000; the Native States over 700,000 square miles, with 3,000,000 people. British India is organized in nine major and 8 minor provinces. The nine major provinces are Madras, Bombay, Bengal, the United Provinces, the Punjab, Burma,<sup>1</sup> Bihar and Orissa, Assam, and the Central Provinces, and each ruled by a Governor assisted by a Legislative Council. The 8 minor provinces are the North-West Frontier,<sup>2</sup> Ajmer, Delhi, Sarg, Baluchistan, and the Andaman Islands, and each is led by a Chief Commissioner. The Native States are ruled by their own chiefs, variously styled Maharajahs, Rajahs, etc. Generally the ruler is advised by a political officer appointed

<sup>1</sup> Burma was separated from India in 1935.

<sup>2</sup> A Governor was appointed in 1932.

by the Government of India, otherwise the native ruler has complete control of the affairs of his State. The Native States fall into two classes—the larger ones, such as Kashmir, Hyderabad and Mysore, which have political relations with the Government of India direct, and the smaller ones, which have political relations with the Governments of the Provinces within which they lie.

In a very large number of cases published statistics refer only to British India ; frequently details for Native States are

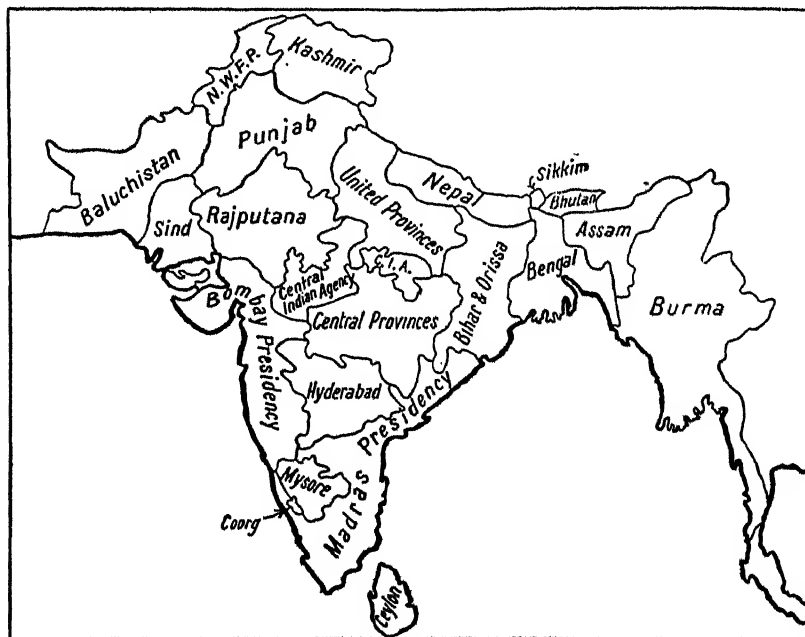


FIG. 73.—The principal provinces and states of India, for purposes of identification.

**Note.**—Bombay Presidency includes Sind, but provision is made in the India Act of 1935 for the creation of Sind as a separate province and for the separation of Bihar from Orissa.

not available. This applies in large measure to agricultural statistics, and is a point which must be kept constantly in mind.

It is very important to note the approximate position and extent of at least the nine major provinces and the principal Native States.

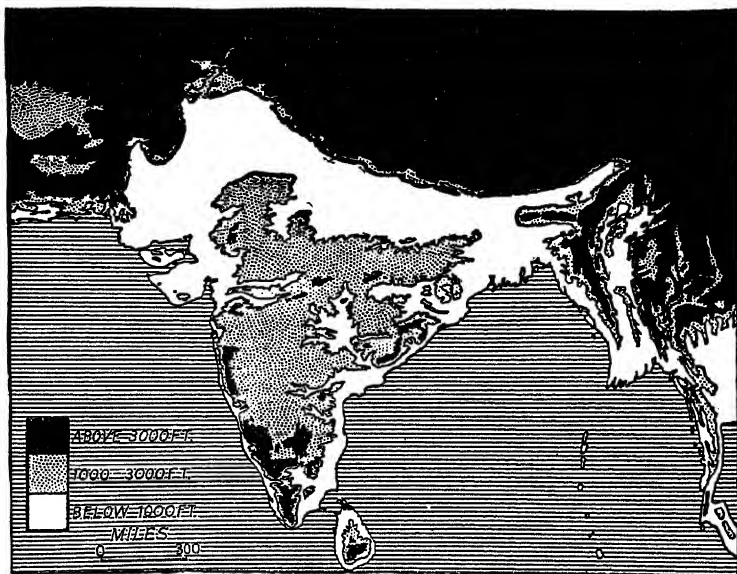
Unless otherwise stated, the descriptive matter which follows refers to India proper, Burma being reserved for separate treatment.

**Physical Features.** It is scarcely necessary to repeat that India is divisible into three main parts :



1. A great mountain wall.
2. A great lowland plain, the Plain of Hindustan, through which flow the Indus, Ganges, Brahmaputra and their tributaries.
3. A great plateau, the Plateau of Peninsular India, using that term for the moment to embrace the whole of India south of the northern plains.

A fourth division must be added for Burma, where the north and south alignment of the physical features is a marked characteristic of the country.



3. 74.—A simple physical map of India, showing the threefold division into the mountain wall, remarkably complete, the great plain, and the plateau.

*The Mountain Wall.* From the Pamir Knot in the extreme north-west the great chain of the Himalayas swings in an unbroken north curve south-eastwards for 1,500 miles. At first, in Kashmir, the chain is complex and it is possible to separate at least three main ranges—the Inner Himalayas, or Zaskar Range; the Middle Himalayas, or Pangi Range; and the Outer Himalayas, or Pir-Panjal Range. At the same time it is scarcely possible to regard as separate the great Muztagh or Karakoram Range which flanks the Himalayas on the north in Kashmir. Eastwards the Himalayan Chain becomes simpler and a twofold division into the Main or Inner Himalayas and the Outer

Himalayas is sufficient. The main Himalayan Range includes Mount Everest <sup>1</sup> (29,141 feet) ; Kinchinjunga (27,815 feet) forms a spur from the main range. Makalu (27,790) and Dhanlagiri (26,795) are other giants. Mount K2 or Godwin Austen (28,250), lies, not in the Himalayas, but in the Karakoram Range of Kashmir.

For some distance westwards from the Pamirs, the Hindu Kush forms the boundary between India and North-eastern Afghanistan ; then follows the tangle of hills on the north-west frontier which merge into the Sulaiman Range between the Punjab and Northern Baluchistan. A re-entrant in the wall, at the head of which lies the Bolan Pass, separates the Sulaiman Range and the Bugti Hills from the Kirthar Range, which lies between Sind and Southern Baluchistan.

The mountains between India and Burma, though forming a continuous curve from North-eastern Assam to Cape Negrais, have received various names. In the north the comparatively simple and narrow divide is known as the Patkai or Patkoi Hills ; then it broadens out into the Naga Hills and the Manipur Plateau, sending a broad branch westwards into Assam. This branch starts as the Barail Range, separated by a col from the Jaintia, Khasi and Garo Hills. Southwards from Manipur are the Lushai Hills and Chin Hills, and then again a narrow wall known as the Arakan Yoma.

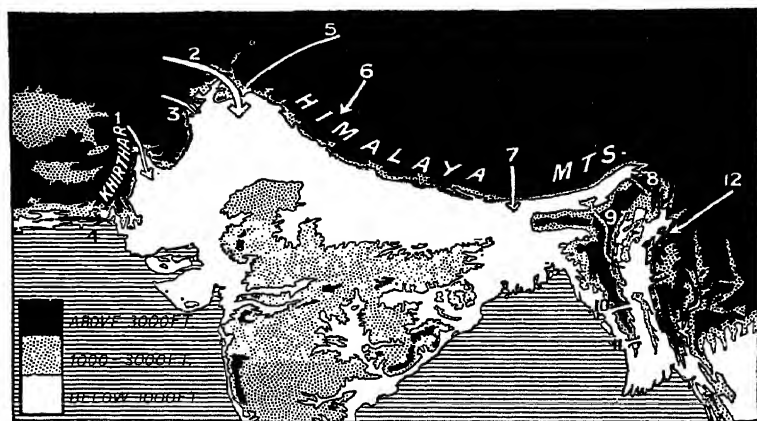
Geologists are not yet satisfied as to the structural relations between the Himalayas at their eastern end and the tangle of mountains which lie to the north-east of Assam and Burma. It is not clear whether the main folds continue eastwards as the Ta-shuch-shan or swing round into the Patkai-Arakan folds.

Emphasis must be laid on the completeness of India's mountain rampart, and hence the importance which attaches to the few possible passes. Undoubtedly the weakest region is in the north-west, on the Afghan frontier, and it is from this direction that India has been invaded again and again. Since—or even before—the days when Alexander the Great used this door into India, it has been a source of danger and remains so even to the present day. Here lies the most famous of all passes—the Khyber Pass—though Alexander did not himself use this route.

It may be useful at this stage to survey briefly the more important of the land routes into India, the approximate positions of which are indicated in Fig. 75. The chief routes in the north-west are the Bolan Pass (1) and Khyber Pass (2) ; another

<sup>1</sup> The attempts to 'conquer' Mount Everest have been recounted by many writers ; see *inter alia* Sir Francis Younghusband, *The Epic of Mount Everest* (London : Arnold, 1926) ; H. Rutledge, 'The Mount Everest Expedition, 1933,' *Geog. Jour.*, Vol. LXXXIII, 1934, pp. 1-17 ; P. F. M. Fellowes and others, *First over Everest* (London : John Lane, 1933).

the Gomal Pass (3); whilst another route lies along the Arabian coast (4). Ancient and mediaeval traders were accustomed to use routes corresponding closely to the Bolan Pass route from Kalat to Gandava and to the coast route via Sonmiani. Alexander arrived by a route rather north of the Khyber Pass and turned by the Bolan Pass. On the north the usual route to Kashmir is from Rawalpindi and Murree to Srinagar. From Srinagar there is a military road to Gilgit and through Hunza, whilst Tibet is reached from Srinagar across the Zoji-La to Leh and thence across the Karakoram Pass (5). From Punjab to Tibet is the Shipki Pass. Thence for hundreds of miles there is no route across the Himalayas till Darjeeling (7) is reached. From India to Burma there are half a dozen routes, none of



75.—The chief routes across the mountain wall of India. The numbers refer to the explanation in the text.

so much used. The Hukawng Valley route (8), and the Zoji-La Gap route a little to the south, lie in the north of Burma. The easiest route is through Manipur (9), whilst the An (10) and Ungu (11) Passes merely link Central Burma and Arakan. The chief route from China to Burma is the Taping Valley route (12).

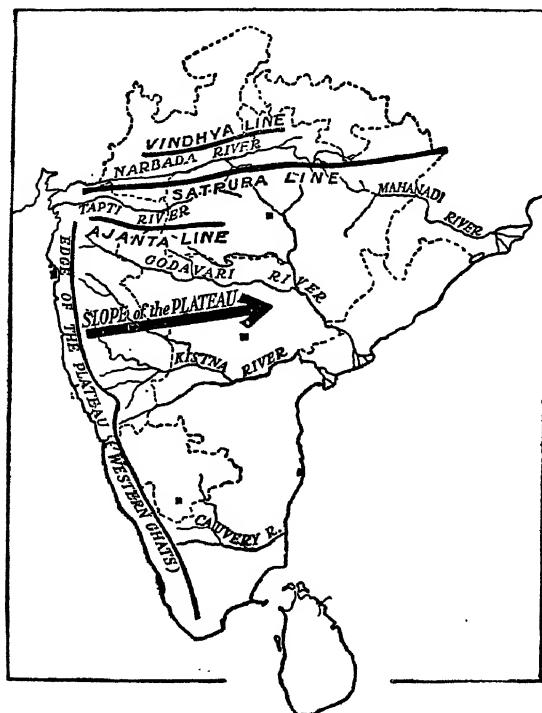
*The Plain of Hindustan.* Inside a mountain wall, and forming a great curve from the Arabian Sea to the Bay of Bengal, lies one of the most important plains in the world. It is more than 2,000 miles from end to end, and usually from 150 to 200 miles broad. There are several outstanding features of this amazing area. One is the dead flatness of the plain—not a hill, not even a mound to break the monotony of the level surface. Another gentle is the seaward slope that it is imperceptible to the

eye. Nearly a thousand miles from its mouth, the Ganges is only 500 feet above sea-level. Another feature is the sudden rise of the Himalayas from the level plain. True, there are foothills, such as the Siwaliks, in places, but they occupy, if present at all, a zone which is inconspicuous in its width. The explanation of this is believed to be in the truth of the supposition that the stable ancient massif of the plateau underlies the plain and that the Himalayas were folded against the edge of it. The third feature of note is the immense thickness, enormous width and uniform character of the alluvium which forms the subsoil of the plain. A distinction is made between the 'older alluvium', in which certain alkaline salts have been segregated by circulating waters and form hard nodules (kankar), and the 'newer alluvium', in which such concretions are absent. But otherwise the uniformity is amazing. Not a rock, not even a pebble is present to alter the uniform character of the alluvium. Geologists are agreed that the present rivers—the Indus, Ganges, Brahmaputra and tributaries—vast as they are, could not have been responsible for this huge spread of deposit. Even a condition when the Brahmaputra joined the Ganges to flow *up* the Ganges Valley to join the Indus (forming one gigantic river, the Indobrahm) seems almost inadequate.

*The Plateau.* Nearly the whole of India south of the great plain is occupied by a plateau which may be referred to, broadly, as the Plateau of Peninsular India. Between latitudes  $21^{\circ}$  and  $24^{\circ}$  N., a very important line of mountains runs across the plateau, roughly from west to east. This line is usually called the Satpura Line, from the name of the range which constitutes its western portion. Thence it passes into the Mahadeo Hills and Maikal Range of the 'Central Highlands', and then into the heights of the Chota Nagpur Plateau. The line is doubly reinforced in the west by the Vindhya Range on the north and the Ajanta Range on the south, and the whole has played a very important part in Indian history. It acted as a barrier against the spread of the Aryans, and it is to the south of this line that we find the Dravidian peoples and the Dravidian languages. The Satpura Line, therefore, is generally considered to mark the division between Northern India on the one hand and Peninsular India or the Deccan Plateau, on the other. There is really no name which can safely be applied, without risk of misinterpretation, to the whole of India south of the plain, though geologically and in some respects geomorphologically it constitutes a single unit.

The plateau is highest in the south and west and slopes, on the whole, eastwards. Large parts of the south of the plateau,

Mysore, exceed 2,000 feet and even 3,000 feet above sea-level. The western edge of the plateau forms the Western Ghats, also known as the Sahyadri Mountains, the eastern edge (much more broken than the western) the Eastern Ghats. The crest of the Western Ghats usually exceeds 3,000 feet, the Eastern Ghats rarely do so in some areas. The Eastern and Western Ghats meet at the south of Mysore, and there, separated from them by a deep valley, is the small but lofty plateau of the Nilgiri Hills. Further



76.—The essential features in the physical geography of the Indian plateau.

th, and separated from the Nilgiris by the Palghat Gap, the Cardamom Hills form the divide between the east and west and terminate in Cape Comorin.

Running from south-west to north-east through Rajputana, the north-west of the plateau, are the Aravalli Hills.

The surface of the plateau has been deeply dissected by river erosion. In the north-west, the Tapti occupies the trough between the Ajanta and Satpura Ranges; the Narmada the high between the Satpura and Vindhya Ranges, and both

rivers empty into the Arabian Sea. North of the Vindhya Range the drainage is almost entirely to the Ganges. South of the Ajanta Range and Central Highlands the general easterly slope of the plateau is reflected in the direction of the rivers. The main water-parting is formed by the Western Ghats. The Godavari, Kistna and Cauvery, with many of their tributaries, rise on the slopes of the Western Ghats, the Mahanadi has a more restricted course in the north-east of the plateau, but all find their way to the east coast. In general the course through the Eastern Ghats is marked by a stretch of rapids.

The plateau of Peninsular India is flanked by a narrow coastal strip on the west and a broader coastal area—not necessarily a plain—on the east. Details of these areas will be given later under the descriptions of the natural regions of India.

*The Rivers of India.* The rivers of India fall into two groups—those of Northern India and those of Peninsular India. The differences between the two groups are fundamental and of the greatest importance. Those of Northern India rise in the mountain wall or beyond it. They do not depend for their water entirely on the monsoon rains, they are fed also by the melting of the snows on the Himalayas. Although the volume fluctuates enormously, these rivers are never dry. They yield a supply of water which, though fluctuating, can be gauged and used for irrigation. Further they traverse, as broad slow rivers wandering lazily across the plains, areas of fertile alluvium, very suitable for irrigation. One might have added formerly that they afforded excellent highways; but on the principle that one cannot have one's cake and eat it too, the use of the water for irrigation has been at least one important factor in the decay of navigation. The three great river systems of Northern India are :

1. The Indus River, with its tributaries the Jhelum, Chenab, Ravi, Bias and Sutlej (the five rivers of the Punjab), all joining to form the Panchnad before uniting with the Indus. Amongst tributaries received by the Indus on the opposite or right bank must be noted the Gilgit in Kashmir, the united Swat and Kabul, so important for irrigation in the Vale of Peshawar, and the Kurram Rivers.

2. The Ganges River, with its tributaries the Jumna (on the right bank, though it rises in the Himalayas), Gogra (with the Sarda), Rapti and Gandak. The tributaries of the Ganges which rise to the south naturally partake of the characteristics of the Peninsular rivers. The chief is the Son.

3. The Brahmaputra River, known through its long Tibetan course as the Tsanpo and in its gorge through the Himalayas

the Dihang, though longer than the Ganges, is less important to India because of its narrower valley and its course in a part of the plain already well watered by heavy rainfall.

The rivers of Peninsular India, rising as they do amongst the hills of the plateau, are fed only by the monsoon rains. In the dry season they often become almost dry,—so nearly dry as to be all but useless for navigation. The inconstant supply of water renders them less suitable for permanent irrigation works, though reference will be made later to the well-known system of tank irrigation. Their valleys, too, are less suitable for irrigation, except in the broad, lower courses such as one finds in the deltas of the Kistna and Godavari. Failure to appreciate these important differences was responsible for a great waste of money in abortive irrigation schemes in Madras.

Finally it should be noted that whereas the rivers of Northern India have a long upper course in the mountains, those of Peninsular India have not.

**Geological Structure.** In its broad lines the structure of India is very simple. There are but two distinct units:

(1) The very ancient stable massif of which the central portion forms the Deccan, together with the later rocks which mask much of its surface and especially its edges.

(2) The belt of fold mountains which wrap round the ancient block and which may perhaps be regarded as owing their existence to compression against its resistant edge.

The basal complex of the ancient block consists of highly metamorphosed rocks—gneisses and schists—of the Archean system. By far the larger part of the Peninsula—the central and southern portions—is occupied by this ancient crystalline complex, whilst to the north-east the rocks occupy wide areas in Chota Nagpur, Orissa and the Central Provinces and to the north-west in the Deccan and other parts of Rajputana. Rocks of granitic type occur intruded into the complex, and special interest attaches to a group of intrusive rocks known as the Charnockite series widespread in Southern India. Occupying long troughs and basins in the basal complex are the rocks of the Dharwar series—highly folded and highly metamorphosed sediments, now appearing as phyllites, slates, schists and marbles. They are often highly mineralized and economically important also as having yielded the famous Mekrana and Jodhpur marbles used by the Moguls for their great buildings in Agra and Delhi. The Cuddapah system is another group of highly folded and highly metamorphosed sediments—slates or schists. With the close of the period when the Cuddapah rocks were folded into the already

complex mass of Archean and Dharwar rocks we are still in the pre-Cambrian era and no signs of life appear in any of these rocks. From that time onwards Peninsular India played its rôle as a stable block of the earth's surface.

The succeeding Vindhyan system of rocks consists of a vast thickness of sandstones, shales and limestones, which are probably also pre-Cambrian in age, but which rest in an almost undisturbed condition on the surface of the older rocks.

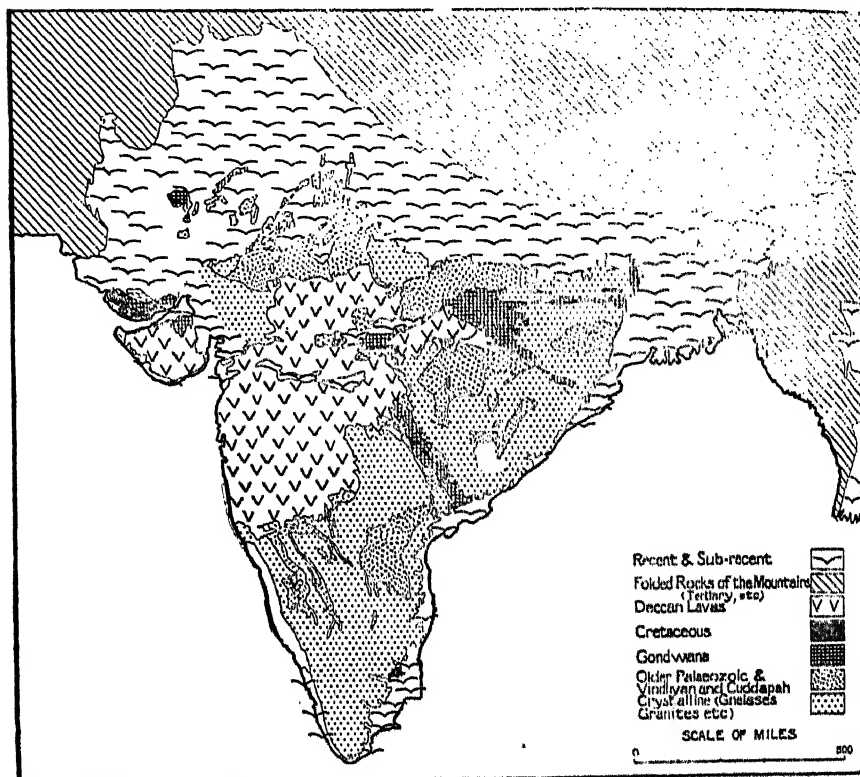


FIG. 77.—Geological map of India.

At a later date Peninsular India formed part of the great Gondwana Continent, and the next important series of deposits are sandstones and shales, most of them of fluviatile or fresh-water origin, which were deposited in hollows on the surface of the continent. They are of great importance because they contain India's coal. From that remote time until the present the Deccan has remained for the most part a continental mass,



ut not one without history. Seas lapped round its margins and at times spread over some of the lower tracts round the margins. The Jurassic seas swept over much of Rajputana and have left traces in the form of sedimentary deposits. Cretaceous seas covered part, at least, of what is now the Narbada Valley and a large part of the Madras coastal area, where they laid down some well-known fossiliferous deposits known as the Trichinopoly Beds. But the most important episode of the Cretaceous period was the pouring out of enormous stretches of basaltic lavas—the Deccan Traps of the older geologists—which cover an area to-day of 200,000 square miles in the north-west of the plateau. They give rise to the characteristic scenery of flat-topped hills of this region. The reappearance of Deccan rocks in the hills of Assam and their presence as small inliers near Delhi are two of the reasons which have led geologists to believe that the ancient massif of the Deccan underlies the great alluvial plains of the Indus and Ganges. Suess sees in this great depression a 'fore-deep' before the high crustal waves of the Himalayan uplift; Burrard, on the other hand, regards the depression as a rift valley. The alluvial deposits cover 300,000 square miles; their thickness has never been ascertained, but borings have penetrated them to the depth of 1,300 feet without reaching a rocky bottom.

It is impossible here to enter into detail regarding the structure of the great encircling belt of fold mountains. There is little doubt that the area now occupied by the Himalayas was a broad deep sea—the Tethys—until well on in the Mesozoic era. The development of the 'Alpine storm' was a gradual process; much of the Himalayan tract was occupied by sea until late in the Tertiary. The mountain building movements culminated in the Miocene, but even the latest Tertiary beds are highly folded and the occasional earthquakes of the present day indicate that movement has not entirely ceased. In the Himalayan chain there is a central core of crystalline rocks, flanked by sedimentary rocks of all ages from Cambrian to late Tertiary. Rocks of later date play an important part in the foothills and in the more open folds of Baluchistan and the India-Burma divide. In the Himalayas the rocks are overfolded and overthrust to the south—that is against the Deccan stable block—as the representative section here reproduced will demonstrate (see Figs. 78 and 11).

**The Mineral Production of the Indian Empire, including Burma.** India, like so many Eastern countries, is still associated in the popular imagination with gold and precious stones. The association with gold is not unwarranted, for India

had a capacity for importing and absorbing gold which was unparalleled by any country in the world, but as a producer India occupies but a minor position. Still more is her minor production marked in the case of precious stones. As a whole, the Indian Empire is not an important mineral-producing country. There are only five minerals of which the annual production exceeds £1,000,000 in value—coal, oil, manganese ore, lead, and gold. If we eliminate Burma, only coal, manganese ore and gold remain to the credit of India proper. In 1931, out of a total population of 353,000,000 less than 350,000 were employed daily in the mining industry. The total annual value of mineral production is only about £25,000,000.

*Coal.* In the ten years 1916–25 India's production of coal fluctuated, somewhat narrowly, between 17·3 million tons (1916) and 22·6 million tons (1919), with an average rather below 20

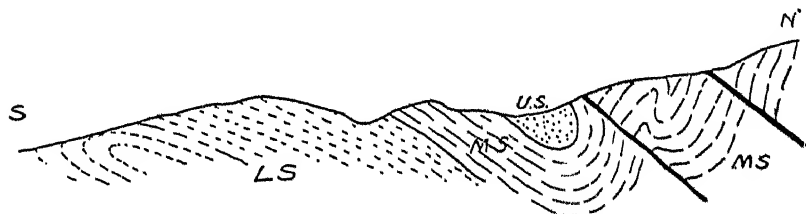
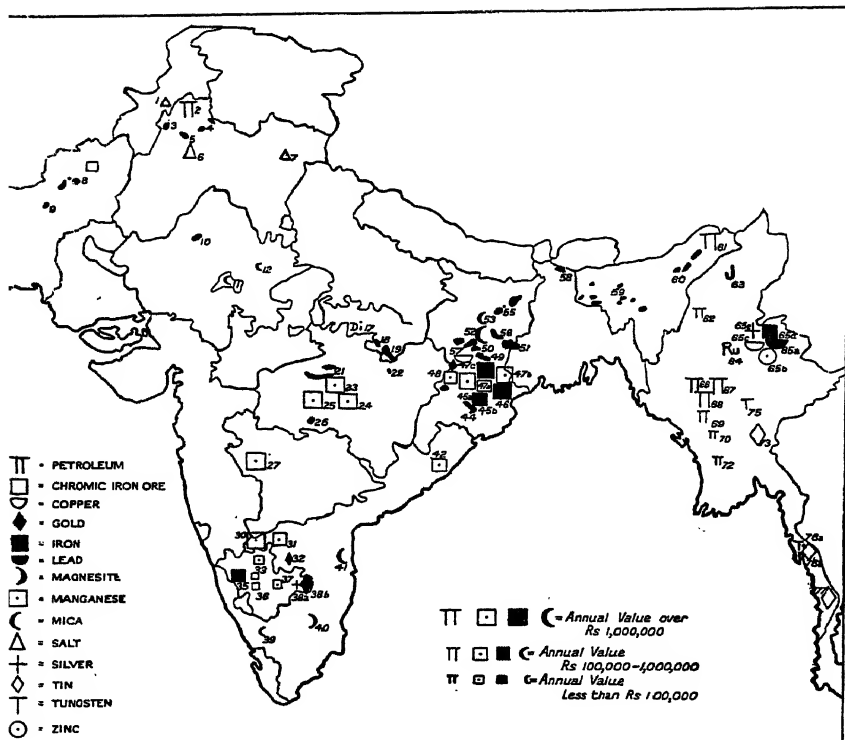


FIG. 78.—Section through the foothills of the Himalayas in the Punjab, showing overfolding and overthrusting even among the highest tertiary rocks (the rocks shown are Lower, Middle and Upper Siwaliks, Mio-Pliocene in age).

million tons. In 1926–30 the average increased to 22·6 million (23·8 million in 1930). Practically the whole of the coal comes from the Gondwana deposits, which occupy ancient depressions in the plateau. Roughly nine-tenths is produced by the group of coal-fields which lie on the edge of the Chota Nagpur Plateau, partly in Bengal and partly in Bihar and Orissa. In the period 1926–30 there was a steady rise in production to 810,000 tons in Hyderabad; rather more in the Central Provinces; about a third of that quantity in Central India. Outside Peninsular India there is an annual production (1926–30) in Assam of 310,000 tons and a little in the Punjab and Baluchistan. It will be noted that all the quantities are very small outside the main coalfields of Raniganj, Jherria and Daltonganj. The Gondwana coal is a bituminous coal usually of good quality. There are large untouched fields of lignite and brown coal in Burma, mostly of Tertiary age, and the coals of Assam and the Punjab are of similar character.

The annual value of the coal produced averaged in 1926–30



#### KEY TO NUMBERS

- |                  |                         |                              |                        |
|------------------|-------------------------|------------------------------|------------------------|
| • Kohat.         | 26. Yeotmal.            | 47a. } Singhbhum             | 63. Upper Burma.       |
| • Attock.        | 27. Balaghat.           | 47b. } District.             | 64. Mogok.             |
| • Mianwali.      | 30. Sandur (State).     | 47c. }                       | 65a. } N. Shan States. |
| • Jhelum.        | 31. Bellary.            | 47d. }                       | 65b. }                 |
| • Shahpur.       | 32. Anantapur.          | 47e. }                       | 65c. }                 |
| • Salt Range.    | 33. Chitaldrug.         | 48. Gangpur State.           | 65d. }                 |
| • Kohat.         | 34. Hassan.             | 49. Ramgarh.                 | 65e. }                 |
| • Khost.         | 35. } Mysore (State)    | 50. Karanpura.               | 66. Yenangyat.         |
| • Kalat.         | 36. } large decrease.   | 51. Raniganj-Jherria.        | 67. Singu.             |
| • Bikanir.       | 37. Tumkur.             | 52. Hazaribagh.              | 68. Yenangyaung.       |
| • Ajmer-Merwara. | 38a. } Kolar.           | 53. Gaya.                    | 69. Minbu.             |
| • Jaipur.        | 38b. }                  | 55. Rajmahal Hills.          | 70. Thayetmyo.         |
| • Central India. | 39. Nilgiris.           | 56. Giridih.                 | 72. Kyaukpyu.          |
| • Umaria.        | 40. Salem.              | 57. Daltonganj.              | 73. } S. Shan States.  |
| • Sohagpur.      | 41. Nellore.            | 58. Jainti.                  | 75. }                  |
| • Mohpani.       | 42. Vizagapatam.        | 59. Khasi and Jaintia Hills. | 76a. } Tavoy.          |
| • Shapur.        | 44. Talchir.            | 60. Naga Hills.              | 76b. }                 |
| • Chindwara.     | 45a. } Keonijhar State. | 61. Digboi; Badarpur.        | 77. Mergui.            |
| • Bhandara.      | 45b. }                  | 62. Upper Chindwin.          |                        |
| • Nagpur.        | 46. Mayurbhanj.         |                              |                        |

FIG. 79.—The Location and Value of Mineral Workings.

The irregular black areas are the coalfields of which only the position and extent are shown. (Map constructed by Miss E. Sandercock.) Note : The missing numbers were for mines, now not in operation, which were producing in 1927. The present map is based on 1933 figures.

9 crores of rupees,<sup>1</sup> or about £7,000,000. The value dropped in 1932-33 to between 6 and 7 crores.

*Petroleum.* Mineral oil ranks second in value amongst the mineral products of India. The production was approximately steady at between 290,000,000 and 300,000,000 gallons for the ten years 1916-25, and this average has been maintained in the period 1926-35. Owing to the rise in prices, the value rose from 4½ crores of rupees in 1916 to an average of 10½ in 1922-25 (equivalent to between £7,000,000 and £8,000,000), dropping to about 6 crores in recent years with lower prices. Over 80 per cent. of the production is from Burma; the remainder from Punjab and Assam. In the Punjab the production is from the little Kaur field which first produced in quantity in 1922. That from Assam is from the two small fields of Digboi and Badarpur. The Burmese production will be considered in detail under Burma. It may be noted, in passing, that there is little possibility of an increased production from the well-explored territory of Burma, or from Assam and the Punjab. Indeed, the prospects for new fields are not bright, though Baluchistan holds out possibilities.

*Manganese ore* ranks third in value amongst India's minerals. The quantity produced annually has reflected world conditions, and, taking the years 1916 to 1926 inclusive, showed a low total of 474,000 tons in 1922 and a record level of 1,015,000 in 1926. As a result of the depression production dropped rapidly to a low level of 213,000 tons in 1932. The ores are fairly widely distributed in the Dharwar rocks of the plateau, but three-quarters of the production was from the Central Provinces. Here the ore is worked in open quarries in the hill-sides in the districts of Balaghat, Bhandara, Chhindwara, Jabulpore and Nagpur. In 1932 Sandur in Madras became the biggest producer. Keonjhar in Bihar and Orissa is also important. The chief use of manganese ore is in the manufacture of ferro-manganese and spiegeleisen—both of which are alloys of manganese and iron. It is also used in the chemical industries. The Indian production is exported entirely in the form of ore. India is the leading producer of manganese ore in the world, Russia second, Gold Coast third.

*Lead* now ranks fourth in value, but it is entirely from the Northern Shan States of Burma—mainly from the silver-lead-zinc deposits of Bawdwin, worked by the Burma Corporation. There was a steady rise in production, and the value in

<sup>1</sup> A lakh is 100,000; a crore 100 lakhs. The rupee had a pre-war value of 1s. 4d. and after considerable fluctuations during and after the War is now standardized at 1s. 6d.

1926 was £1,624,000, falling in 1933 during the depression to £870,000.

*Gold* occupies fifth place and the production is now practically restricted to the Kolar Goldfield of Mysore. The production has been comparatively steady, fluctuating between 380·8 and 393·5 thousand ounces of fine gold in the period 1921–26, but has fallen recently, reaching 336,000 oz. in 1933. Expressed in sterling the industry has profited by the high price of gold (£2·08 mn. in 1933).

*Salt.* The production of salt in India reaches an annual value of nearly a million pounds sterling, and a total quantity usually rather over 1,700,000 tons. Included in this total is an annual quantity of about 300,000 from Aden. Three other areas contribute the remainder in roughly equal quantities—the coasts of Madras, the coasts of Bombay and the mines of the Salt Range in the Punjab.

*Saltpetre* is produced in considerable quantities in the Punjab, United Provinces and Bihar, but the output has been decreasing in quantity and value since the use of artificial fertilizers became general. Saltpetre in India is a natural product formed in alluvial soils from animal and vegetable refuse in a climate with alternating dry and wet seasons. The efflorescence was collected from the soil and purified.

*Mica* is a characteristic Indian mineral, and India is one of the world's large producers. The supplies are from the Nellore mines of Madras and especially the Hazaribagh, Gaya and Monghyr districts of Bihar and Orissa. Some of the Nellore sheets are said to be 9 feet in diameter and are of great purity. A use has been found in the manufacture of micanite, or mica boards, and the enormous amount of scrap-mica which was formerly wasted. The annual production of mica ranged between 32,000 and 55,000 cwt. in 1916–25 and the value between 12 and 24 lakhs of rupees. In 1926–33 the production has averaged 40,000 cwt., but the value dropped greatly in 1932 and 1933.

*Iron ore.* Special interest attaches to the production of iron ore in India. Ores of varying grades are widely distributed; leaving on one side those which are comparatively inaccessible, there are numerous deposits of excellent ore readily available. Yet the production in 1926 was only 1,660,000 tons of ore, valued at £350,000. Even this marks a big increase over previous years, and on the whole there has been a steady rise from about 400,000 tons in the last ten years. The bulk of the present output is from Mayurbhanj, Singhbhum and Keonjhar in Bihar and Orissa, and output of ore showed a steady rise to 2,400,000 tons of ore in 1929, followed by a decrease. Much discussion has

taken place in recent years regarding the establishment of a large iron and steel industry in India; the pioneers in the actual production of iron and steel have been the Tata Iron and Steel Company. Under a policy of protection pig-iron production reached over a million tons in 1933, of which 370,000 tons were exported, half to Japan. In the meantime it may be noted that the local indigenous iron smelting industries had practically disappeared.<sup>1</sup>

*Chromite* is found in many parts of India and is at present produced to the value of about 5 lakhs of rupees annually in Baluchistan, Mysore and especially at Singhbhum.

*Copper ore* is now obtained from Singhbhum (Bihar and Orissa), and also from Burma.

*Silver* and *Zinc* are also products of Burma, almost entirely from the Bawdwin mines.

*Tin ore* and *Tungsten ore* (Wolfram) are obtained in Tenasserim (Burma), where there is a continuation of the Malayan tin belt, and further north in the Shan States.

*Precious* and *Semi-precious*. A few diamonds are still found in the Central India States; rubies, sapphires and spinels are still found in native diggings in the Burma Ruby Mines district, though the European Company, after many vicissitudes, is now defunct. Jade is obtained from Upper Burma and exported to China.

Amongst the minerals not already mentioned may be noted the magnesite of Madras; the monazite formerly produced in Travancore, steatite (soapstone) of Burma, bauxite and ochre. Building and ornamental stones are widely quarried in many parts of India; and so is limestone for the manufacture of lime and cement.

Details of the minerals of India and their occurrence will be found in D. W. Wadia's *Geology of India* (Macmillan). Every year a Report on the Mineral Production of India is published in the *Records of the Geological Survey of India* and every five years a volume of the *Records* is devoted to a *Quinquennial Review of the Mineral Production*. In the long series of Memoirs and Records issued by the Geological Survey most of the important mineral deposits have been dealt with. Burma is included in the territory surveyed. The whole of the Indian Empire is gradually being surveyed, and maps on the scale of one inch to one mile are available for many areas. They are hand coloured and copies are prepared on request by the Geological Survey at Calcutta.

<sup>1</sup> See C. S. Fox, 'The Raw Materials for the Iron and Steel Industry of India,' *Trans. Mining and Geol. Inst. India*, Vol. XX, 1925, pp. 87-194.

*Soils.* Elsewhere in this book the very large part played by climate in the formation of soils has been emphasized. Provided there is an approximate chemical similarity between the original rock types—e.g. alluvium and gneiss may have a composition roughly the same—the soils formed therefrom will probably be almost identical. This is particularly the case in regions of heavy rainfall where laterite forms. A large percentage of lime in the original rock may exercise a controlling influence on the resulting soil, but not always. Broadly speaking, India has four main types of soil :

- (1) The 'red' soils of the crystalline tracts—on the whole indifferent thin soils formed over regions of crystalline rocks where the rainfall is poor or moderate (Southern Deccan).
- (2) The black cotton or *regur* soils—formed over the Deccan lavas with poor or moderate rainfall.
- (3) The alluvial soils, characteristic of the northern plains.
- (4) The laterite soils, formed in regions of heavy rainfall with a dry season.

The writer has shown<sup>1</sup> that over limited areas soil and climate may counteract one another thus :

Very light soil + moderate rainfall	} have vegetation cover same in both cases.
Clayey soil + light rainfall	

**The Climate of India.** We have already considered in broad outline the climate of India, and it remains to recapitulate the main features and to consider the variations. We will ignore those areas lying outside the mountain wall—in particular Baluchistan—where the climate is of an entirely different type. It must then be emphasized, in the first place, that the climate of India is essentially of one type—the tropical monsoon type. Too much is apt to be made of the local variations ; important, for example, as the winter rains in the Punjab may be, they are a feature entirely subsidiary to the main summer rainfall régime. The seasonal rhythm is a feature of such importance that it may be said to dominate all phases of Indian life, and may conveniently form the basis for a general account of the climate.

There are three seasons in India :

- (a) The Cold Weather, from October to the end of February.
- (b) The Hot Weather, from the beginning of March to the beginning or middle of June.
- (c) The Rains or Rainy Season, from the beginning or middle of June to the end of September or October.

<sup>1</sup> Stamp and Lord, 'The Ecology of Part of the Riverine Tract of Burma,' *Journal of Ecology*, 1925.

The welcome breezes of the north-east monsoon are not, as a rule, felt until November, and October is really an unpleasant intermediate month when the rains are drying up but the cold weather has scarcely commenced. Hence there is considerable justification for the grouping of the seasons adopted by the Meteorological Department of the Government of India:

(a) The season of the north-east monsoon:

- i. January and February, cold-weather season.
- ii. March to mid-June, hot-weather season.

(b) The season of the south-west monsoon:

- i. Mid-June to mid-September, season of general rains.
- ii. Mid-September to December, season of retreating monsoon.

*Conditions in the Cold-Weather Season.* In January, which is the typical cold-weather month, there is, as one would expect, a steady increase of average temperature from north to south. At Peshawar it is below  $50^{\circ}$ ; in the northern part of the Punjab Plains below  $55^{\circ}$ , and as far down the Ganges Valley as Benares below  $60^{\circ}$ . The days are warm as an English July, but the nights are distinctly cold and slight frost is common. Madras, on the other hand, has a January average of  $75^{\circ}$ ; frost is quite unknown. Calicut has  $78^{\circ}$  and Colombo  $79^{\circ}$ . The January isotherms have, therefore, as shown in Fig. 80, a comparatively regular east-west trend. Topography plays such an important part in Indian climatic conditions that it seemed of value to give also a map showing the actual temperatures in January. This has been done in Fig. 81 and serves to emphasize the wall of cold air coinciding with the mountain wall of India.

Pressure conditions in January show a rather feeble high-pressure area developed over the cold plains of the north-west from which the winds blow outwards—making their way gradually towards the Equatorial belt of low pressure, gathering in force as they go. An isobar map of Asia really gives an entirely false impression in that it shows the low-pressure area of North-west India linked with that of Central Asia. Actually there is no connection between the two: the Himalayas form an effective barrier, projecting well into the upper layers of the atmosphere. There is a twofold result of this: in the first place India does not suffer from the intensely cold winds which sweep across China in the winter, and in the second place the winds are generally but light, averaging only 2 or 3 miles per hour in Northern India. It has been suggested that there is really a connection between these winds and the high-pressure system beyond the Himalayas, and it is pointed out that strong winds blow down the gorges of the Himalayas by which the great rivers of India



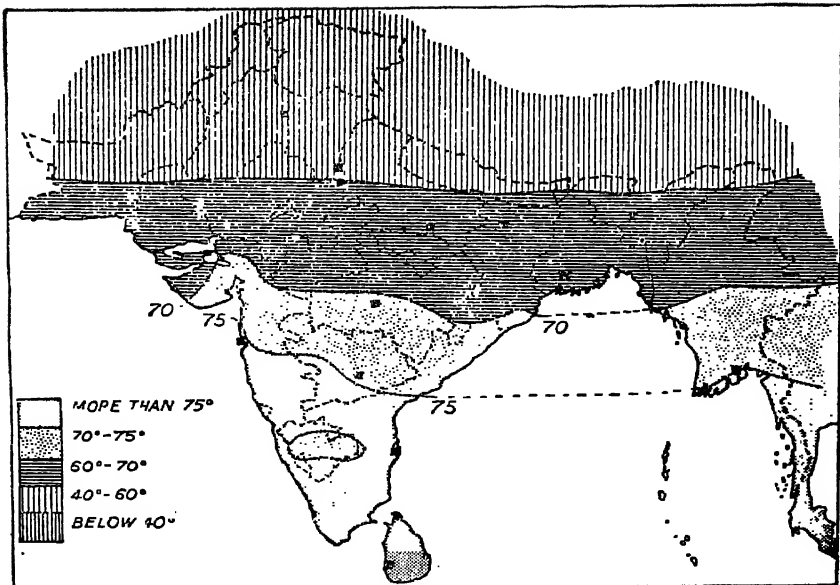


FIG. 80.—January isotherms.

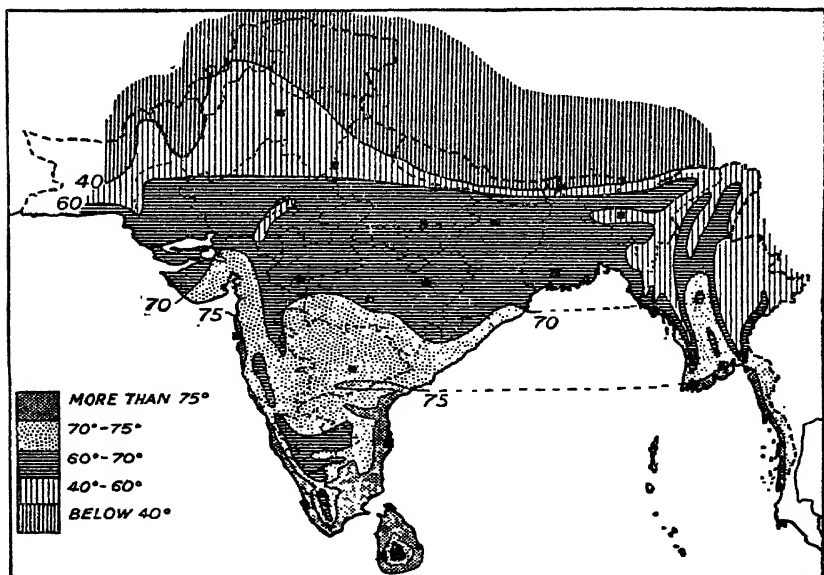


FIG. 81.—Actual temperatures in January.

reach the plains. But these winds are night winds: during the day there is actually a breeze *up* the gorges.

The outward-blowing winds of India in the cold season are controlled in their direction by the topography—they are westerly or north-westerly down the Ganges Valley, northern in the Delta, becoming north-easterly (the direction of the normal Trade Winds) over the Bay of Bengal. These off-shore winds are naturally dry, and January and February are delightfully fine, rainless and cloudless months over most of India. Except in the north-west and the extreme south the cloud-covering rarely exceeds two-tenths. Ceylon and the extreme south, being within  $10^{\circ}$  of the Equator, are within the influence of the Equatorial belt and are influenced by temporary northward migrations of the Equatorial low-pressure belt. The east of Ceylon has a considerable rainfall brought by the north-east monsoon, which has there crossed the Bay of Bengal.

Mention must be made of the cold-weather storms which are an important exception to the generally fine weather in the north-west. From December to March cyclones, originating over the Mediterranean, travel slowly eastwards across Persia and Baluchistan or Afghanistan and down over the plains of the Punjab. They are only shallow depressions and are accompanied usually by light winds only, but they provide an appreciable rainfall, especially in the Northern Punjab (see graph for Lahore, Fig. 89). They usually die out before reaching the lower part of the Ganges Valley. These rains are of special importance to the winter crops of wheat and barley, and their absence in Burma explains the failure of wheat in districts otherwise suitable. Although of considerable importance, the amount of rain is small, even in the Punjab, in comparison with the monsoonal fall. It is probable, however, that these cyclones deposit the bulk of the snowfall on the mountains of Kashmir and the north-west.

The cold weather is a season much appreciated by Europeans in India. In the north, the native population find the nights and early mornings unpleasantly cold, and activity is often deferred until the sun has warmed the air. It is curious how one becomes accustomed to continued heat and unable to appreciate even normally stimulating coldness. The writer remembers staying in the United Provinces one January after some years in Burma, and thinking that the early morning cold was the most intense he had ever experienced, though the thermometer actually registered  $39^{\circ}$  F. In Assam and Bengal, moisture is abundant in the air, early morning mists are common and the cold weather is less bracing. Further south, in places

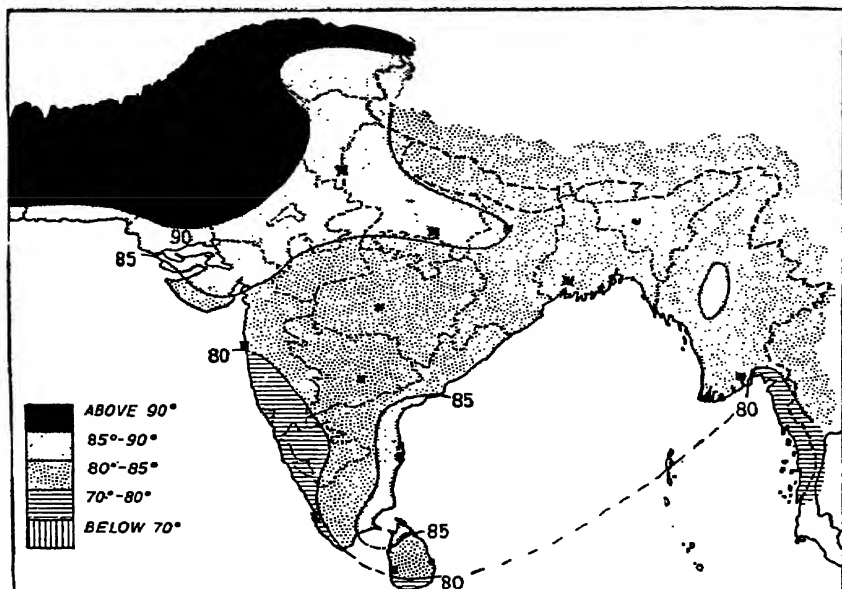


FIG. 82.—The climate of India—July isotherms.

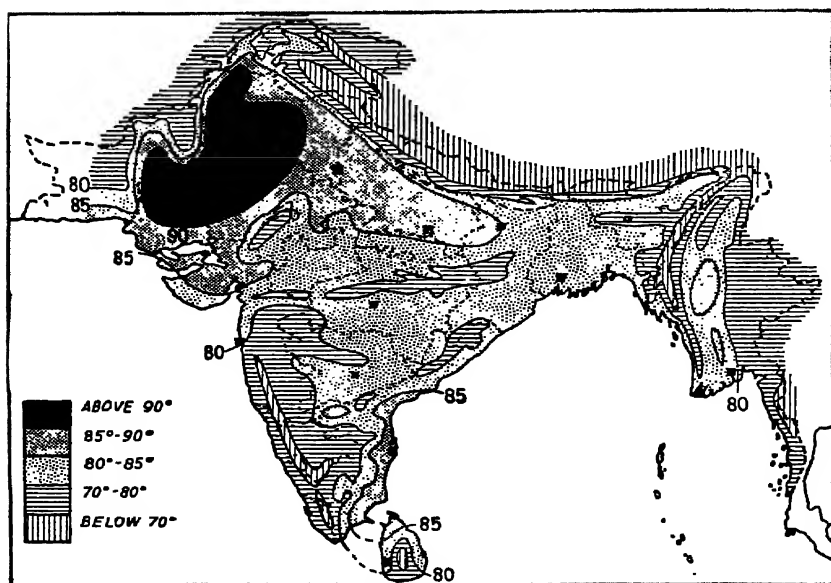


FIG. 83.—The climate of India—actual temperatures in July.

like Rangoon and Madras, one appreciates a blanket or even two at night, though the thermometer may rarely drop below 65°.

*Conditions in the Hot-Weather Season.* With the northward movement of the sun temperatures rise rapidly and in March the hot weather begins. The cooling breezes of the north-east monsoon are no longer felt—except in the northern plains—and along the coasts the most marked winds are land and sea breezes. In April and May the sun is vertical over India, and these are the hottest months over most of India. Average temperatures in May exceed 85° even in the humid delta of the Ganges and 90° over the Middle Ganges. The air is very dry, and over the dry north-west the relative humidity may even be as low as 1 per cent. Diurnal variation is large, especially in the interior. In Sind, for example, the daily range in May may be from 75° or 80° to 105° or 110°. In most of the drier regions of India and Burma the thermometer rises above 100° for some hours during the day in April and May. The effects of temperatures greater than blood-heat are curious until one gets accustomed to them. Everything feels warm to the touch—one is so used in the ordinary way to finding something cool to touch that this is at first very curious. The writer used to find that temperatures above 105° produced a curious lethargic condition. One normally rests during the heat of the day, but it is often too hot to sleep or read, and it is possible to reach at times a curious state of coma when the mind is a perfect blank. This is said by some to be an impossible state of affairs, but it only needs to be experienced to be believed.

By April or May a feeble but definite low-pressure area has developed over India and the winds are in-shore, bringing considerable rain to Southern India, South-eastern Ceylon and the coasts of Burma. These are the well-known 'Mango showers'. This rain falls mainly during violent thunderstorms, which tend to develop later in the afternoon and may continue with intense flashes of lightning and tremendous thunderclaps until late in the evening. In the drier districts there is no rain, but violent dust storms are frequent. Sometimes the storms are in the form of tornadoes or whirlwinds of small diameter. The writer has, on many occasions, been camped in the deathly still, lifeless *indaing* in the Dry Belt of Burma with not a breath stirring, not a living thing moving during the heat of the afternoon, when suddenly a noise like the roar of an express train has arisen from apparently nowhere and a little tornado can be seen sweeping across the dry hill-sides, whirling dust, leaves, twigs and small branches in hopeless confusion. Rotten Euphorbia trees are

rooted as if by magic, when suddenly the storm dies down as quickly as it began. Such conditions are favourable for the development of tropical cyclones, which are especially dangerous this season in the southern part of the Bay of Bengal.

*Conditions during the Rainy Season.* About the middle of June the monsoon bursts. The word 'bursts' aptly describes the suddenness of the change which is initiated, as a rule, by a great downpour of rain accompanied by violent thunder and lightning. Even in those regions where the mango showers and the afternoon thunderstorms have, as it were, heralded the change, there is nevertheless a sudden and unmistakable difference from the day the monsoon actually breaks. The strong, steady north-westerly winds, for one thing, mark the difference. The reversal of the winds is, of course, the low-pressure area over North-

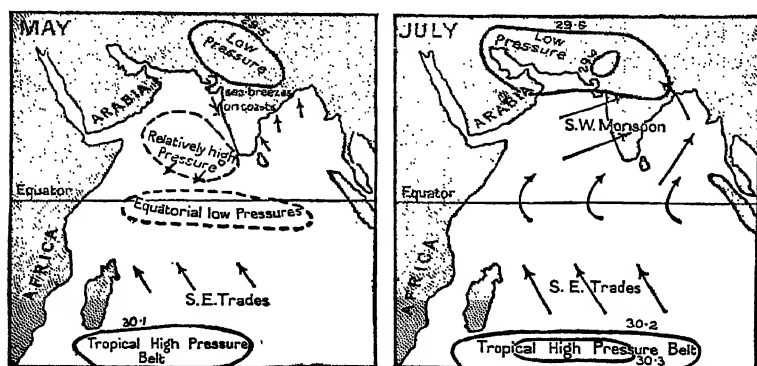


Fig. 84.—Diagram of monsoon conditions, showing Sir John Eliot's conception of the cause of the 'bursting' of the monsoon.

western India (for Burma there are subsidiary low-pressure centres over the Dry Belt of Burma itself). Two things must be emphasized. India is quite cut off from Central Asia, there is no connection between the Punjab low-pressure centre and that over the heart of the continent. In the second place, the low-pressure area has already been in existence for months or two before the monsoon arrives. Why the sudden change, which is no mere intensification of the previous light sea-breeze? Sir John Eliot, late Government Meteorologist of India, believed that during India's hot weather there existed still the normal Equatorial low pressure towards which the north-east trades were drawn and which was separated from the northern Indian area by a ridge of higher pressure. The Equatorial low pressure and the ridge of high pressure to the north

act as barriers, suddenly they are overcome and the south-east Trade Winds are drawn across to the North Indian area.<sup>1</sup>

It is certain that the rain-bearing wind is one of much greater strength than the light cold-season monsoon—in general at least twice the strength. At Bombay its average speed is 20 miles per hour, in other parts of India rather less. The actual direction of the winds is controlled to a marked degree by the topography of the country. There are two main streams, separated by the land mass of Peninsular India. The influence of that over the

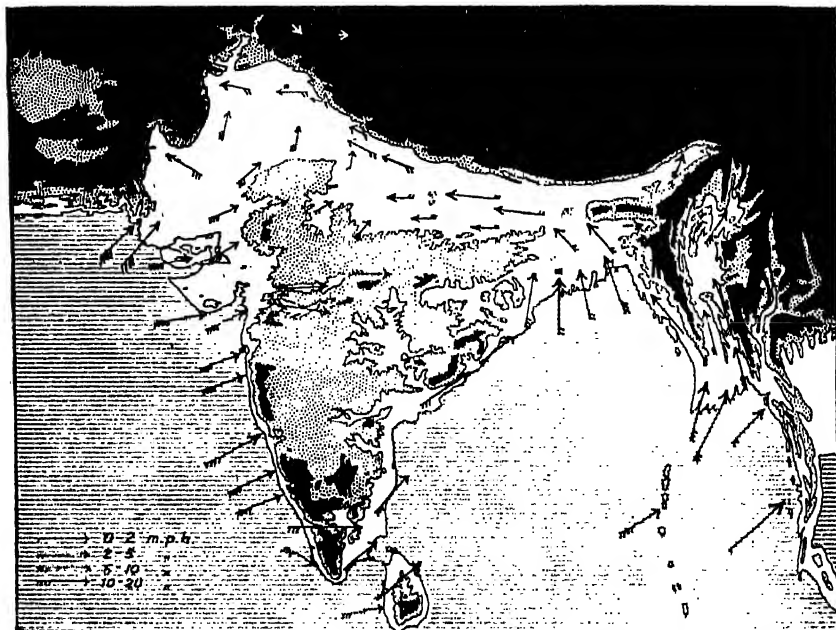


FIG. 85.—Map of India showing the average direction and strength of the monsoon winds in July.

The length of the arrow is in proportion to the steadiness of the wind; strength is shown by the number of barbs.

Arabian Sea scarcely extends north of the Gulf of Cambay. The Bengal stream blows up the Ganges as an east wind, reaching the Punjab from the south-east. Naturally the burst of the monsoon is experienced first on the west coast and arrives rather later elsewhere :

	Mean Date of Commencement.	Mean Date of Ending.
Bombay . . . . .	June 5	October 15
Bengal. . . . .	June 15	October 15-30
Punjab . . . . .	July 1	September 14-21

<sup>1</sup> See also G. C. Simpson, *Quart. Jour. Roy. Met. Soc.*, 1921.

With the exception of the Madras Coast all India derives the bulk of its rainfall from the south-west monsoon. Even in the wettest parts, however, it must not be supposed that it rains continuously. Heavy downpours are interspersed by fine intervals, though in the wetter parts it is rarely that one sees the sun. In the drier regions—up the Ganges Valley and in the dry Belt of Burma, sunny periods are usual, and the rains fall during the passage of series of depressions not unlike those of the Westerly wind belt in Europe. Nearly everywhere the rains result in a welcome drop in atmospheric temperature; hence in most parts of India June, July, August and September are cooler than March and April. Only in the driest regions—the Punjab and Sind are the extremely high temperatures continued in June and July. This is a point not always appreciated by dwellers in other parts of the Northern Hemisphere who are apt to think of July and August as the warmest months. The rains are not generally unpleasant; the dried-up ground, here before not a particle of green was to be seen, appears to live once more, and nature revives as it does in the spring of more northern latitudes. The most unpleasant feature of the rainy season is usually the high humidity. Nothing will dry. Despite the temperature of over 80°, European residents in such places as Rangoon (rainfall 99 inches) have charcoal fires in order to get some semblance of dryness to their bedclothes and undergarments. Doors swell and refuse to shut; drawers do the same and refuse to open; boots and shoes have an unpleasant habit of growing green whiskers in the night; anything which has been stuck together with gum or glue promptly crumbles into fragments.

There is little difference in a rainfall map of India for the whole year and a rainfall map for the rainy season. Fig. 86 is a rainfall map for the whole year. Certain isohyets only have been selected—those of 80 inches, 40 inches and 20 inches. These lines are extremely important, and their position should be borne in mind when considering the distribution of natural vegetation, forests, agriculture and irrigation in India. They serve to distinguish four rainfall areas:

- (a) The rainfall division with more than 80 inches a year. The natural vegetation is normally evergreen forest and the great food crop is rice. There is rarely danger of famine through drought, but considerable danger of destruction of crops by floods. Earthworks are frequently undertaken, as in the Rangoon Delta, as a protection against floods.
- (b) The rainfall division, with between 40 and 80 inches a

year, may be called the region of moderate rainfall. Monsoon forest, in which the trees are leafless in the hot weather, is the natural vegetation; there is a mixture of dry-zone and wet-zone crops, but rice usually predominates. Irrigation is normally unnecessary, but irrigation works may be undertaken as a protective measure against years of drought.

- (c) The rainfall division with between 20 and 40 inches may be called the region of poor rainfall. The natural vegetation is usually scrubland; forests only grow in favoured localities. This is the region of the typical

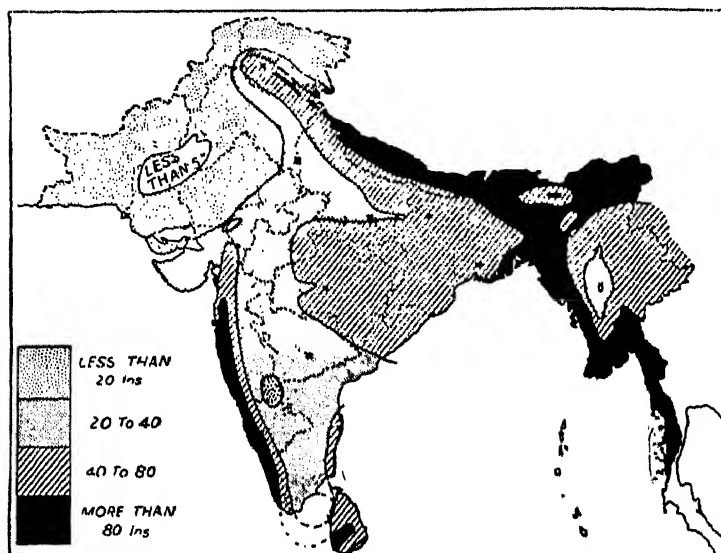


FIG. 86.—A rainfall map of India for the whole year.

dry-zone crops such as millet; wet-zone crops (such as rice) can only be grown with the help of irrigation. India's great famine zones lie in regions with less than 40 inches of rain. Not only does the rainfall tend to be inadequate, but it falls, as we have seen, during the passage of depressions. It is apt to vary considerably in amount from year to year, hence the danger of famine which is only obviated by large irrigation works.

- (d) The rainfall division with less than 20 inches of rain is desert and semi-desert. Permanent cultivation is almost impossible without irrigation.



*Conditions during the Period of the Retreating Monsoon.* In October the rains become much less intense, the skies clear and the sun appears, causing the temperature to rise. The land is water-logged; the atmosphere humid and the temperature over the whole of India is remarkably uniform—a few degrees above or below  $80^{\circ}$ . The month is unhealthy and unpleasant—'muggy' is the usual adjective applied to the weather. In November and December the temperature drops considerably in the north. Over the sea and land the south-westerly current

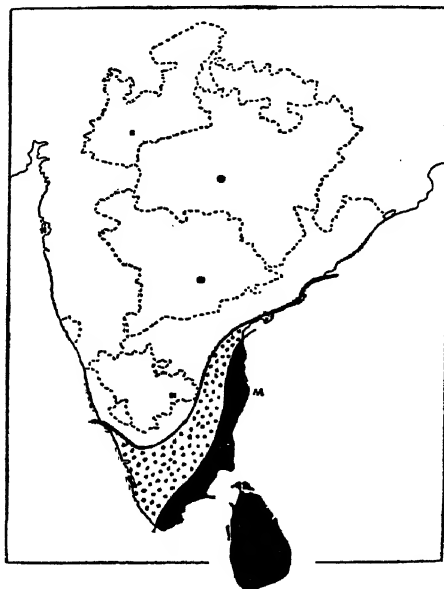


FIG. 87.—The cold weather rainfall of Southern India.

The area shown black receives more than ten inches of rain in the months of November and December, the dotted area more than five inches. It must be emphasized that this cold season rain falls during the period of the retreating monsoon and not when the north-east monsoon is blowing.

the air practically ceases and the air becomes stagnant. Local variations in heat and moisture give rise to tropical cyclones. A large number of these seem to originate in the neighbourhood of the Andaman Islands and travel towards the west or north-east over the Bay of Bengal. These cyclones normally bring much rain to the coasts of Madras, where November and December are the wettest months, whilst the remainder of India is almost dry. These tropical cyclones are sometimes very destructive to life and property.

*The Climatic Regions of India.* The simplest climatic regions

of India are those based primarily on rainfall and may be arranged thus :

- | Climatic regions.   | Natural Regions.                  |
|---|-----------------------------------|
| (a) Regions with more than 80 inches:   |                                   |
| (1) West Coast:   | Same.                             |
| i. North—long dry season. Example: Bombay.  | Same.                             |
| ii. South—short dry season. Example: Trivandrum.  | { Deltas, E. Hills, Assam Valley. |
| (2) Bengal and Assam. Example: Chittagong.  | { N.E. Plateau. Middle Ganges.    |
| (b) Regions with 40 to 80 inches:   | Same.                             |
| North-east plateau and Middle Ganges Valley. Example: Nagpur.   | { S. Deccan.                      |
| (c) Regions with 20 to 40 inches:   | { N.W. Deccan.                    |
| (1) Carnatic or Tainil Region in which the wettest months are November and December. Example: Madras. | { U. Ganges Plain.                |
| (2) Southern and North-western Deccan with mean January temperatures of 65°-75°. Example: Hyderabad.  | { Central Indian Foreland.        |
| (3) Upper Ganges Plain with lower January temperatures and higher July ones. Example: Delhi.          | { Punjab Plains (Northern).       |
| (4) Northern Punjab Plains where winter rainfall is important. Example: Lahore.                       |                                   |
| (d) Regions with less than 20 inches:   |                                   |
| (1) North-west lowland. Example: Karachi.   | { Punjab Plains (South).          |
|   | { Sind. Thar. Rajput Upland.      |
| (2) North-west plateau. Example: Quetta.  | { Baluchistan. N.W. Hills.        |

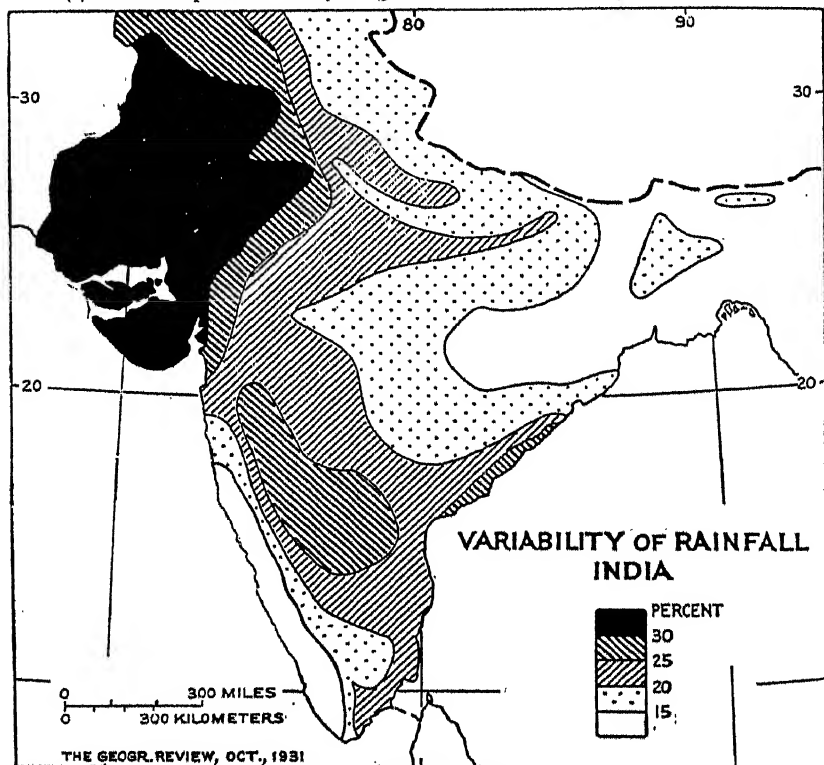


FIG. 87A.—The variability of rainfall in India (after A. V. Williamson).

The Himalayan region should be considered separately (Examples: Simla and Darjeeling). Later in this section we shall describe India under natural regions; we have indicated by the

of the climatic regions the correspondence with the natural regions distinguished later on.<sup>1</sup>

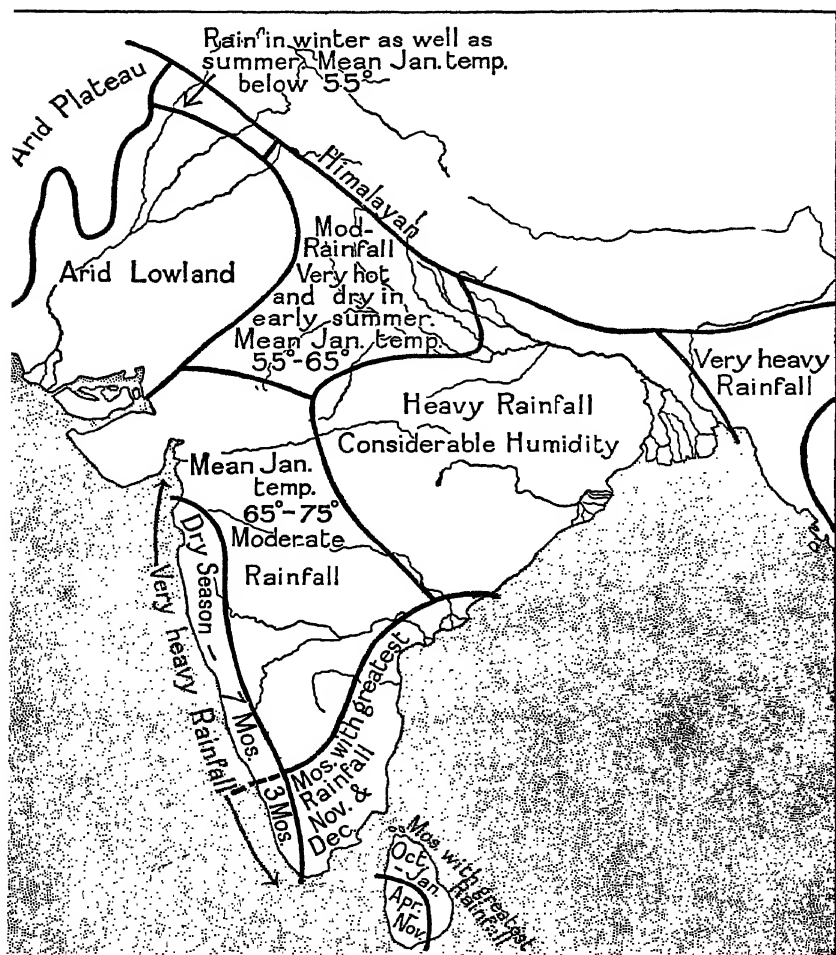


FIG. 88.—The climatic regions of India.

<sup>1</sup> Of the very greatest importance to India is the variation in the monsoon from year to year. In fact it is not too much to say that this is the biggest single factor influencing life in India. It would be of immense advantage to be able to predict the character of the monsoon rather even just before the rains break, and to this end research has been directed and attempts made to correlate the Indian weather sequence with weather in other parts of the world. The results have not been very decisive. See R. C. Mossman, 'On Indian Monsoon Rainfall in relation to South American Weather, 1875-1914,' *Mem. Indian Meteor. pt.*, Vol. XXIII, Part VI, pp. 157-242 (Calcutta, 1923).

**Irrigation in India.<sup>1</sup>** From the foregoing account of the rainfall of India, it is clear that large areas suffer naturally

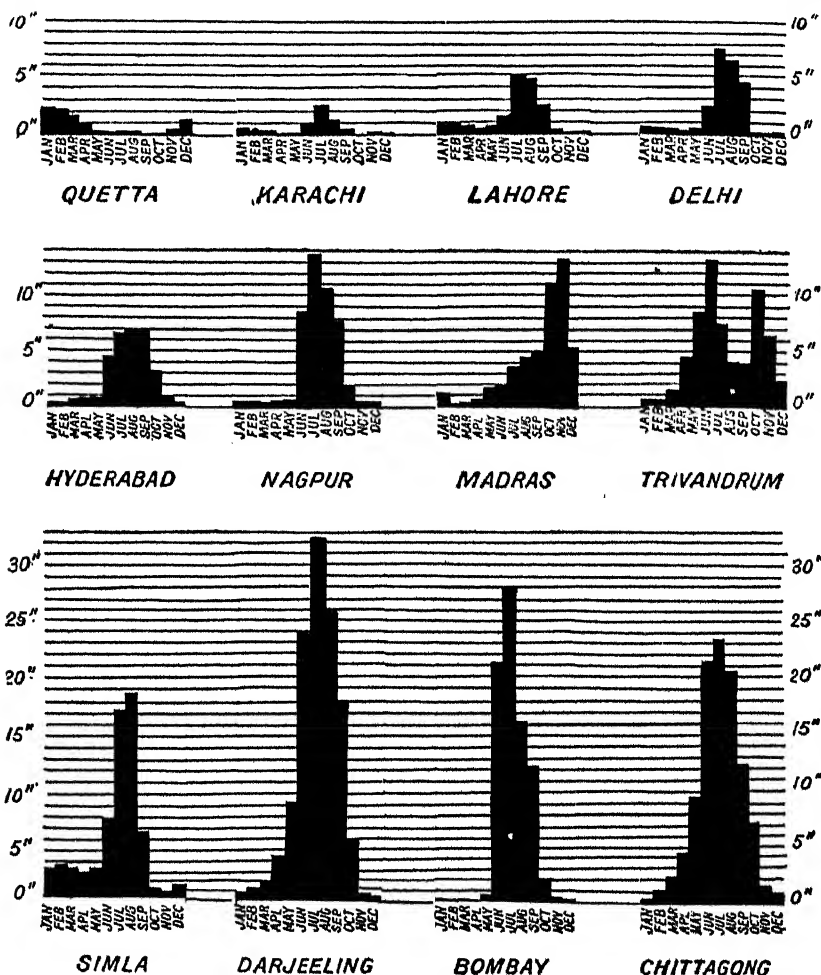


FIG. 89.—Rainfall graphs for towns characteristic of the climatic regions of India.

from a deficiency of moisture. A large part of the Punjab Plains and the lower Indus Valley in Sind, to take the out-

<sup>1</sup> For further details reference may be made to the official publication, *Triennial Review of Irrigation in India*, and to a small book, unfortunately without maps, 'Irrigation in India,' by D. G. Harris (*India of To-day*, Vol. III) (Oxford University Press). See also A. V. Williamson, 'Irrigation in the Indo-Gangetic Plain,' *Geographical Journal*, Vol. LXV, 1925, pp. 141-153.

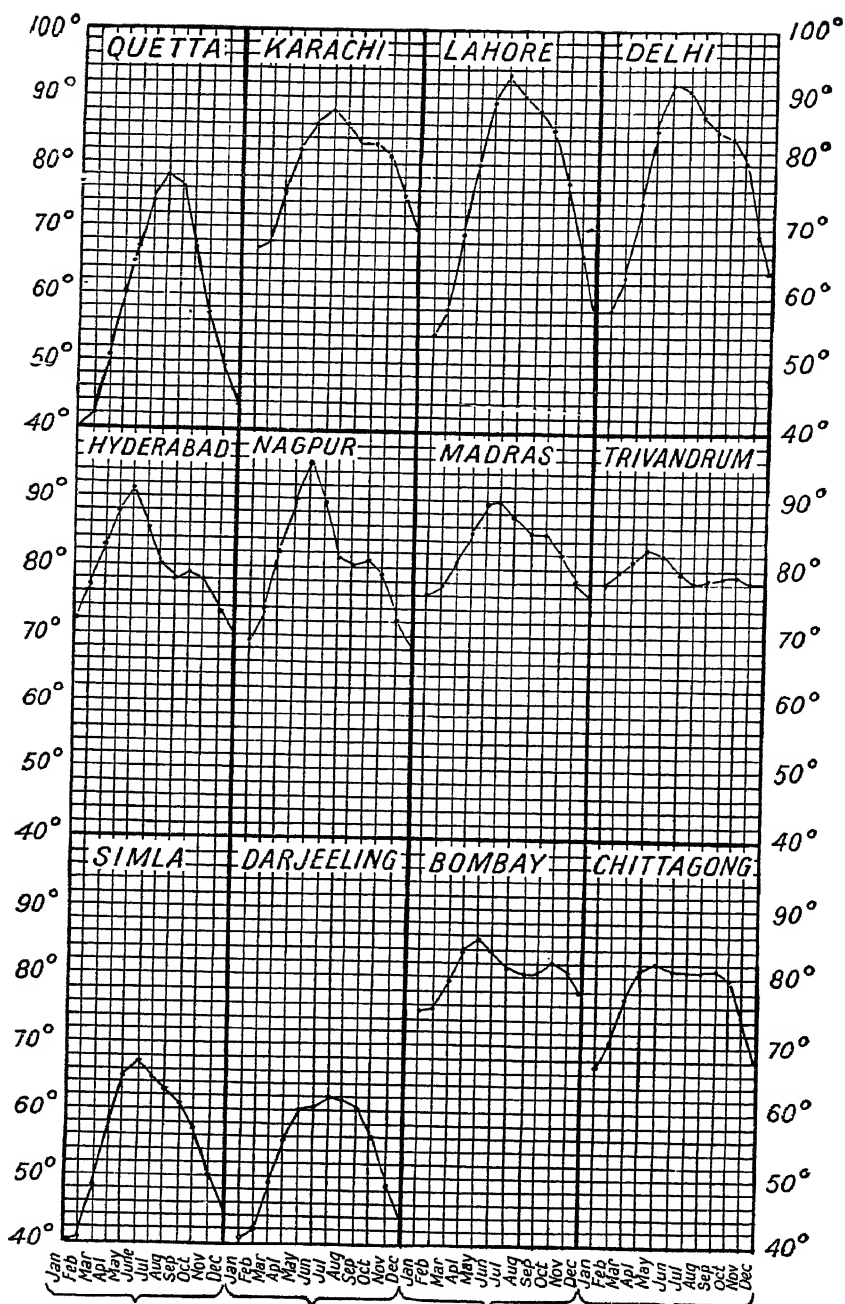


FIG. 89A.—Temperature graphs for towns characteristic of the climatic regions of India.

standing case, have a rainfall of less than 20 inches a year, although their soil is naturally a fertile alluvium, such a rainfall is totally inadequate for agriculture in a tropical country like India. Moreover, in those regions with normally a better rainfall and where 'dry crops' are the mainstays of agriculture wide fluctuations from year to year have resulted in the past in terrible famines. It is to be noted that the 'famine areas' of India are not the driest parts, but those parts with an intermediate rainfall. From very early times the inhabitants of India have sought to take advantage of the richness of the soil in such dry areas as the Punjab by irrigating the land and have attempted to insure against drought by the construction of wells and tanks in those areas with a moderate rainfall.

But the vast irrigation works now so characteristic of India are mainly a product of the last hundred years. Modern engineering skill is only a partial explanation of this. Comprehensive irrigation schemes involve, in the first place, the complete control of the sources of water; where a river basin is occupied by a number of independent powers, the attempt of any one of the riverine nations to utilize the water of the river for its own benefit is apt to result in continuous strife. Difficulties arise, as they did in Australia over the river Murray, even with friendly groups of the same race. Finally, only a wealthy central authority can undertake the initial cost. Thus the British Indian Government, the first to control the whole of the sub-continent, has been able to carry out irrigation schemes on a scale which would have been impossible to a group of smaller authorities, however well inclined.

It is difficult to realize the huge extent of irrigation works in India. Taking British India alone (India excluding Native States), out of 262,000,000 acres actually under crops in 1930-31, 53,763,000 acres were irrigated—a fifth of the whole. In Native States, as far as statistics are available, out of 70,000,000 acres under crops, 10,000,000 were irrigated—nearly a seventh of the whole. Expressed in another way, the area irrigated in India is roughly ten times the total area of cultivated land in the most famous of all irrigated countries, Egypt. One scheme alone, the Lloyd Barrage Scheme in Sind, has recently added to the permanently irrigated land of India an area greater than the total cultivated land of Egypt. It has been said, with some approach to truth, that India adds an Egypt to her area every year and the world takes no notice.

It will be seen from the table on page 199 that five types of irrigation are distinguished. Canals are distinguished as Government or private. From the point of view of construction a more

important division is into perennial canals and inundation canals.

## IRRIGATION IN INDIA, 1930-31.

Areas in thousands of Acres.

Province.	Area Irrigated.					Total Area Irrigated.	Area of Crops Irrigated. (b).
	By Government Canals.	By Private Canals.	By Tanks.	By Wells.	Other Sources.		
Madras . . . . .	3,700	145	3,614	1,244	450	9,153	11,325
Bombay . . . . .	3,209	83	125	622	106	4,145	4,501
Bengal . . . . .	77	204	1,115	32	307	1,735	1,891
United Provinces . . . . .	3,060	45	64	4,914	2,143	10,227	11,215
Punjab . . . . .	10,239	398	33	4,013	129	14,814	15,071
Burma . . . . .	663	264	178	17	349	1,471	1,514
Bihar and Orissa . . . . .	775	901	1,599	565	1,420	5,260	5,345
Central Provinces . . . . .	(a)	960	(a)	124	45	1,130	1,130
Assam . . . . .	—	306	1	—	271	579	579
N.W.F.P. . . . .	392	410	—	81	90	973	975
Ajmer-Merwara . . . . .	—	—	31	108	—	139	146
Coorg . . . . .	2	—	1	—	—	4	4
Delhi . . . . .	40	—	2	24	—	67	67
British India . . . . .	22,160	3,716	6,765	11,745	5,310	49,697	53,763
Hyderabad . . . . .	61	91	634	440	52	1,278	1,179
Mysore . . . . .	143	22	577	93	297	1,132	1,148
Baroda . . . . .	1	—	3	125	—	129	138
Gwalior . . . . .	—	39	16	148	4	207	225
Kashmir . . . . .	174	512	4	7	21	719	808
Madras State . . . . .	254	77	219	24	1,112	1,687	1,747
Central India (c) . . . . .	—	12	25	264	11	311	311
Rajputana (d) . . . . .	403	6	74	685	134	1,302	1,385
Punjab Agency . . . . .	2,056	137	—	520	19	2,733	2,921
Punjab States . . . . .	9	25	—	9	73	117	135
Bombay States (e) . . . . .	13	—	—	65	—	78	83
U.P. States (f) . . . . .	47	39	5	52	18	161	161
Total . . . . .	3,163	960	1,557	2,432	1,741	9,854	(g) 10,283

(a) Included under private canals.

(b) The area of crops irrigated is greater than area of land irrigated because of 'double cropping'.

(c) Seven States only.

(d) Eleven States only.

(e) Six States only.

(f) Three States only.

(g) Includes 42,000 acres for which details are not available.

It should be noted that Baluchistan, Orissa States and other large areas are not included. The 'Punjab Agency' are States in the Punjab having direct relations with the Government of India.

*Perennial Canal Irrigation* is by far the most important type of irrigation in India. To the end of the year 1930-31 the British Government has spent 136 crores of rupees—roughly

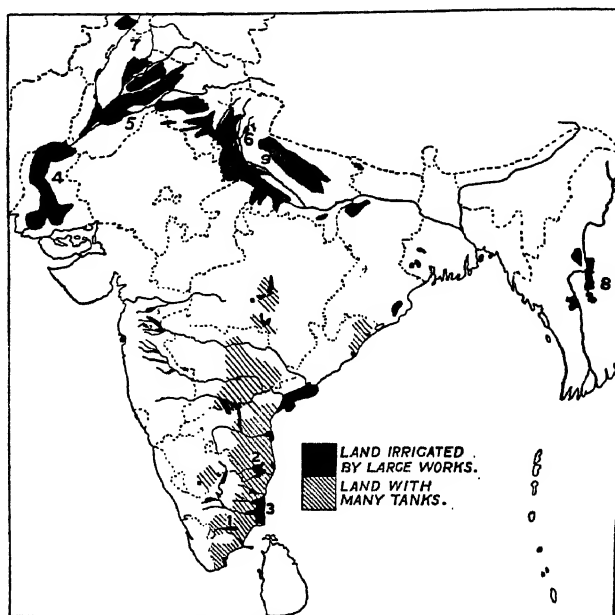


FIG. 90.—Irrigation map of India.

1. Periyar system.
2. Cheyyar, Poini and Palar system.
3. Cauvery Delta system.
4. Sind (Lloyd Barrage scheme).
5. Punjab.
6. Ganges-Jumna systems.
7. Vale of Peshawar.
8. Dry Belt of Burma.
9. The Sarda Scheme.

£102,000,000—on irrigation works in India. The most important works are in the drier parts of the great plain—in the Punjab,

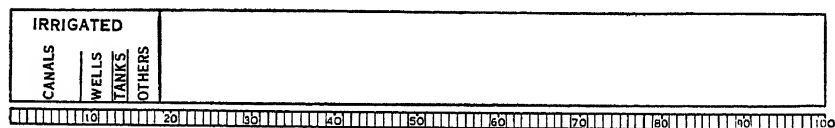


FIG. 91.—The percentage of the sown area of the whole of India under irrigation, 1930-31. Nearly a fifth of the crops are irrigated.

United Provinces and Sind—and will be considered in detail later. Twenty-four per cent. of the expenditure has been in the Punjab; 16 per cent. in the United Provinces; 14 per cent.



in Bombay, including Sind; and 9 per cent. in Madras. The Government canals in India, at the end of the year 1930-31, included 22,912 miles of main and branch canals; 49,618 miles of distributaries, and irrigated 26,600,000 acres. The percentage return on the capital outlay varies enormously; on the whole, it has averaged about 6 per cent. for the last ten years, net, after deducting the working expenses from the gross revenue. The working expenses average 46 per cent. of total receipts.

*Inundation Canals* are fed by the rivers, from which they take their water, in the flood season only. In the past they have

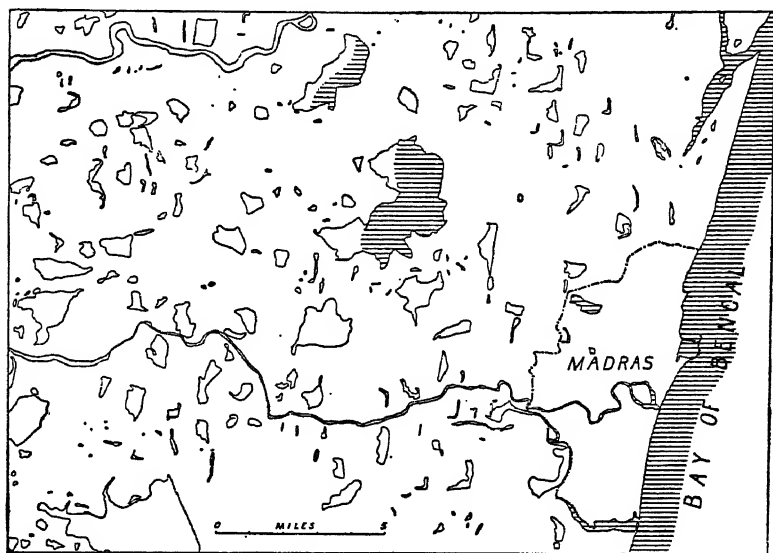


FIG. 91A.—Tank irrigation in India.

Sketch-map showing the immense number of, and huge area occupied by, tanks in the vicinity of Madras city. Only those lined have permanent water.

been very important, especially in Sind, but they are being replaced by permanent canals. They have the double disadvantage that just in those seasons when water is most needed they are liable to be but partly filled, and that they cannot take full advantage of the river supplies, and dry up in the hot season.

*Tanks.* In most of the drier parts, especially of the southern and south-eastern parts of Peninsular India, mud walls are built across the valleys of small streams, so that water collects and forms a pond or lake during the wet season. Such ponds or lakes are designated by the rather misleading title of 'tanks'. The water is utilized at the close of the rainy season, but in the

hot season the tanks dry up completely. In years of scarce rainfall, when water is most needed, the danger is that the tanks may never be filled owing to the insufficient rainfall. The table given above shows that tank irrigation is of prime importance in Hyderabad, Mysore and Madras, and of somewhat less importance in Bihar and Orissa.

*Wells.* Although the surface of the land may be dry in the drier regions, there is often water at a short distance below the surface. This water can be reached by wells and brought to the surface. In the north-eastern parts of the United Provinces, not yet served by canals, wells are very important.

*Karez.* This peculiar type of irrigation is found in Baluchistan.

*Other types of irrigation.* Large areas—over 10 per cent. of the whole area irrigated in India—are still watered by such primitive means as bucket lifts from streams.

**The Natural Vegetation of India.** Some reference has already been made, in dividing India into climatic regions, to the controlling influence which rainfall exerts upon the distribution of natural vegetation. Excluding for the moment the mountainous areas, India falls naturally into four rainfall-vegetation regions<sup>1</sup>:

The Wet Zone, with a rainfall of over 80 inches (Evergreen Forests).

The Intermediate Zone, with a rainfall of 40 to 80 inches (Deciduous or Monsoon Forests).

The Dry Zone, with a rainfall of 20 to 40 inches (Dry Forest and Scrubland).

The Arid Zone, with a rainfall of less than 20 inches (Desert and Semi-Desert).

Additional types are Hill and Alpine Forests in the mountains, Tidal and Riparian Forests.

*The Evergreen Forests* are found chiefly on the west coast of the Peninsula, on the lower slopes of the Eastern Himalayas, in Assam, Eastern Bengal, the wetter parts of Burma and the

<sup>1</sup> The present writer elaborated these divisions for Burma: Stamp, *The Vegetation of Burma* (Calcutta: Thacker, Spink & Co., 1925). The same division is used by Troup (*Silviculture of Indian Trees*), Schlich and others (*Manual of Forestry*, Vol. I), but they adopt rather lower rainfall limits thus:

Wet Zone: over 75 inches.

Intermediate Zone: 30 to 75 inches.

Dry Zone: 15 to 30 inches.

Arid Zone: less than 15 inches.

These would seem to be the minimum amounts necessary for each type of forest: the writer worked on the optimum or characteristic amount for each type.

Andaman Islands. The forests are of Equatorial type; high humidity and even temperature favour vigorous growth and many of the trees reach a height of 200 feet and over. As in the true Equatorial forests, the number of species is very large and often only one of a species will be found in an acre of forest.

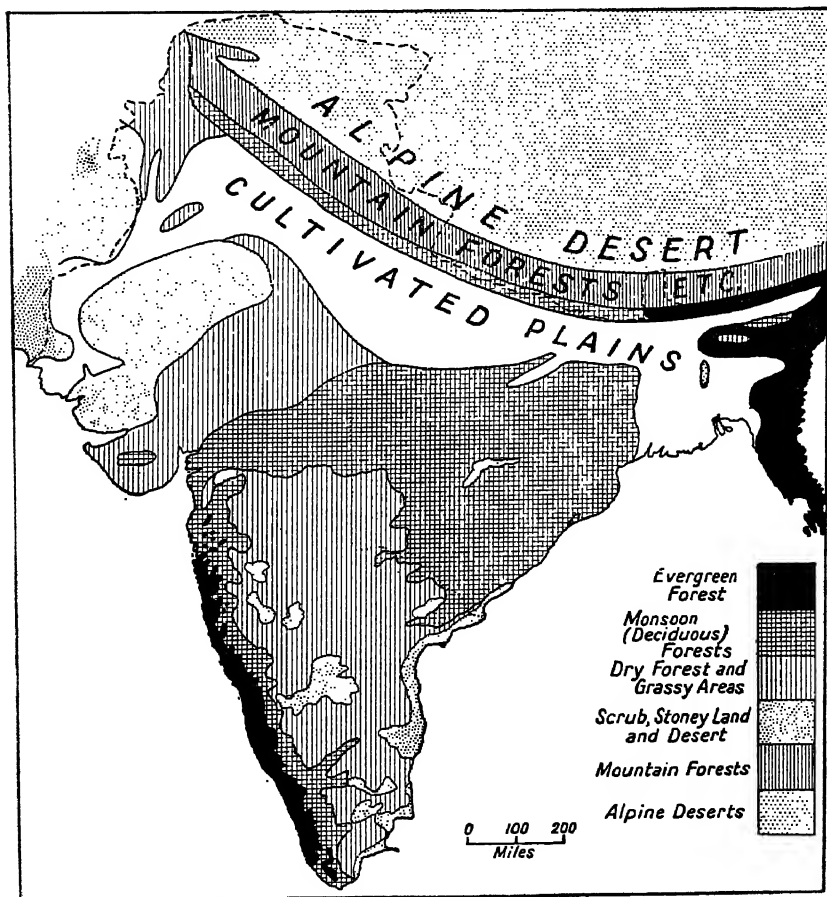


FIG. 92.—The natural vegetation of India.

South India is based on the map published by Hilda A. Wilcox (*Geographical Teacher*, Spring, 1922). The finely dotted line is the south-western limit of sal.

This is a serious disadvantage in exploitation, where it is usual to work only one or two types of timber. In addition many of the trees have wood which is extremely hard, in other cases of little value. Hence the evergreen forests are comparatively unimportant. Even within 30 miles of such a centre as Ran-

goon, they remain to this day liane-choked, fever-stricken haunts of wild elephants. Some species of trees occur in all three areas (West Coast, Bengal-Assam and Burma-Malaya), and examples are *Mesua ferrea*, *Michelia*, *Eugenia*, *Calophyllum*; others are more restricted. Bengal-Assam is rich in *Castanopsis*, whilst in Burma-Malaya more than half the trees belong to the family of the Dipterocarps.

*The Deciduous or Monsoon Forests* are the characteristic forests of India, and occur over nearly half the area of the country, but especially in four tracts—a strip along the wetter, western side of the plateau; a great block in the north-east of the plateau; the sub-Himalayan tract; and Burma. The forests are mostly very mixed, but four species stand out because of their economic importance. *Teak* (*Tectona grandis*) grows through most of the Peninsula proper, but not on the east coast, and in Burma, excluding the coastal districts. It is rarely found as pure stands. In Burma its important associate is the Burma ironwood, or pyingado (*Xylia dolabriformis*), much in demand for railway sleepers. The *Sal* (*Shorea robusta*), in contrast to teak, is gregarious and grows in two main areas—the north-eastern plateau and the submontane tract of the Eastern Himalayas. The *Sandalwood* (*Santalum album*), though evergreen, occurs in the deciduous forests of Southern India. Reference will be made later to the Indaing or Eng Forests of Burma, which are found in the drier parts of the Intermediate Zone and with a rainfall between 30 and 40 inches.

*The Dry Forests or Thorn Forests and Scrubland* occur in the drier parts of the Deccan, North-western India and the Dry Zone of Burma. The small trees often develop enormously long roots and are often armed with sharp spines—as a protection against destruction by animals. Various species of *Acacia* are characteristic.

*The Semi-Deserts and Deserts* are marked by the occurrence of stunted bushes, often of species found elsewhere as forest trees. *Acacia catechu* is a good example. Plants with succulent stems or leaves, notably *Euphorbia*, are also characteristic.

*The Hill Forests or Mountain Forests* are usually found above the 'frost line', except that in the dry north-west frosts occur also on the plains. Frosts do not usually occur below 5,000 feet in Southern India and the extreme south of Burma; in Upper Burma and Assam, below 3,000 feet. The mountain forests include evergreen oaks, succeeded, generally at higher levels, by conifers. Details will be given later under the description of the Himalayan regions and Burma. The Deodar (Himalayan Cedar, *Cedrus deodara*), blue pine (*Pinus excelsa*),

chir pine (*P. longifolia*), silver fir (*Abies Webbiana*) and spruce (*Picea morinda*) are economically the most important trees.

*The Tidal Forests* occur along the sea coast and in the estuaries of rivers; especially in the Sunderbans, the Andamans and Burma. The mangrove swamps, though the most familiar type, are not as important as the lofty forests of Kanazo (*Heritiera*) of Burma.

*The Riparian Forests* are of minor importance.

It will be gathered from this description that the natural vegetation of India is essentially forest, and that even the desert tracts are really very dry types of forest. Patches of grassland occur interrupting the monsoon forests on the hills, and much of the open thorn forest has a carpet of grass, but otherwise grassland is not characteristic of India. It is a popular fallacy that forest when cleared and then deserted returns to forest. Such is usually not the case: the deserted clearings become covered with forest 'weeds', especially bamboo. Enormous areas of India are occupied by useless, waste jungle which has originated in this way.

It must be borne in mind that in a thickly populated country such as India the natural vegetation has been cleared over enormous areas. Nevertheless, taking British India (complete statistics are not available for Native States), forests cover nearly a third of India <sup>1</sup>:

	Area in Square Miles.	Percentage of Land Area.
State forests for timber production . . .	126,300	11.6
Other State forests . . . . .	125,200	11.5
Total State forests . . . . .	251,500	23.1
Forests of Corporate Bodies. . . . .	8,000	.7
Forests of Private Individuals . . . . .	77,000	7.1
Total of all forests . . . . .	336,500	30.9
Agricultural land . . . . .	431,900	39.5
Other land . . . . .	322,400	29.6
Grand total of Land Area . . .	1,090,800	100.0

<sup>1</sup> Table from Schlich's *Manual of Forestry*, Vol. I. The figures given in Agricultural Returns are entirely different because of the classification of the land. The agricultural statistics recognize as forests only the land legally administered as such (11.8 per cent. of the area of British India in 1930-31). Other forest land is classed as 'not available for cultivation' or 'waste'.

The preceding figures are for the year 1918-19; later figures show a decrease; thus in 1925-26 the total area of State forest had dropped to 228,000 square miles, or 20·7 per cent. of land area. More than half this total area lies in Burma, where it is found more than a quarter of the State's 'Reserved forests'.

The exploitation of 'reserved forests' is carefully regulated by Government, and is carried out either by Government agents or by lessees under supervision. The method of working the timber of the forests is interesting. It is cut in the dry season and dragged to the small streams by elephants or buffaloes. With the advent of the rains the streams rise and the logs are floated down to the main river. There they are joined together to form rafts—in the case of heavier timbers such as pyingadi—are provided with bamboo floats—and floated down to the saw-mills. It may take two or three seasons for logs to 'come out' of the area in which they have been felled.

The principal timbers extracted have already been mentioned. In addition enormous quantities of firewood are obtained, and many of the so-called 'forests' are areas of scrubland reserved for the sake of economizing fuel-wood. Amongst other forest produce may be noted resin (especially from *Pinus longifolia*), bamboo; grasses for fodder—in ordinary years enormous numbers of cattle graze in the forests; in times of scarcity the grass is cut and the hay sent to threatened districts; tanning materials, essential oils (mainly from sandalwood and planted Eucalypts), wood oils; cutch (a dye obtained in Burma); and finally lac. India has practically a monopoly of the lac industry and the export is of great value. Lac is the sticky secretion caused by a small insect which is now artificially propagated on a small scale.

In the last ten years, 1921-22 to 1930-31, the outturn of timber and fuel-wood has varied between 255,000,000 cubic feet (1924-25) and 411,000,000 cubic feet (1925-26) (value 456 lakhs of rupees or £3,400,000), with an average of about 360,000,000. In 1930-31 the outturn was 323,000,000 cubic feet valued at 606 lakhs of rupees. The value of minor produce has varied between 125 lakhs (1916-17) and 152 lakhs of rupees (1928-29). The latter figure is equivalent to over £1,000,000. These figures refer to State forests of British India only.

**Agriculture.** India is essentially an agricultural country. Nine-tenths of the vast population depend on agricultural pursuits for their existence. Despite the population of 353,000,000, there is still a surplus of food-grains available for export—wheat from the Punjab and rice from Burma (though not from India proper).

Fairly complete agricultural statistics<sup>1</sup> are available for British India (except Baluchistan), but only for certain of the Native States. Before dealing with agriculture, some explanation of the classification used is necessary. The total area of India (1,819,000 square miles or 1,164,009,000 acres) is distributed as follows :

	Acres.	Population.	Agricultural Statistics.
(1) British Provinces . . . .	669,345,000	271,527,000	complete
(2) Indian States lying within British Provinces . . . .	76,172,000	26,367,000	partial
(3) Indian States having direct relations with the Government of India . . . .	369,228,000	57,645,000	partial
(4) Specially administered areas	16,293,000	2,686,000	none
(5) British Baluchistan . . . .	34,706,000	463,000	none

The details which follow will refer to the 669,345,000 acres of British India and to 141,175,000 acres of the Native States—rather less than a third of their total area.

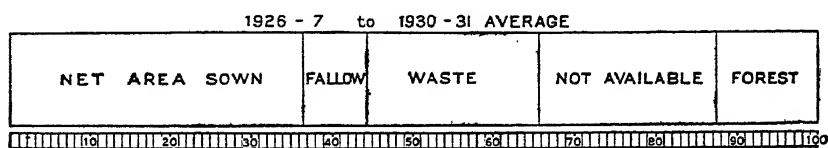


FIG. 93.—The uses of the land in British India.

The total area of British India now to be considered is thus 669,345,000 acres. Out of this total current fallows occupy 49,618,000 acres (7.4 per cent.); net area sown, 229,115,000 acres (34.2 per cent.). These are the figures for 1930-31, but approximate very closely to the average for the ten years 1920-21 to 1930-31, and are rather above the average for the last twenty

<sup>1</sup> *Agricultural Statistics of India* (annual), Vol. I, British India; Vol. II, Native States (Calcutta: Published by Government of India). Since 1920-21 the acreage and yields are only published for the provinces and states; they were formerly given for each district, and it is from the district statistics that the details for each natural region, given later, have been obtained. For a general account of agriculture, see J. Mackenna, *Agriculture in India*. An indispensable and convenient work of reference on all matters relating to agriculture is the *Abridged Report of the Royal Commission on Agriculture in India* (London: His Majesty's Stationery Office, 1928). See also R. Mukerjee, *The Rural Economy of India* (London: Longmans, 1926), and A. Howard, *Crop Production in India* (Oxford: University Press [1925]). For an important geographical treatment see W. D. Jones, *Geographical Review*, Vol. XIX, 1929, pp. 495-96.

years. Thus in British India 230,000,000 acres support a population of 272,000,000—representing about .85 of an acre per head of population (compare figures given for China). Allowing for double cropping, the acreage under crops was 262,000,000—nearly 1 acre per head.

The total area of Native States reporting was 141,175,000 acres. Out of this total fallows occupy 11,017,000 acres (7.7 per cent.); net area sown, 70,117,000 acres (49.4 per cent.). Again these are the figures for 1930-31, but approximate closely to the five-year average.

It is clear from the table on page 213 that the Native States lie, generally speaking, in the drier and less productive parts of India, hence the high proportion of millet. Combining the figures for British India and those Native States reporting, we find we have records for 333,500,000 acres. On this cropped land the principal crops occupy the following percentages—a table giving a good guide to the use of agricultural land in India, excluding the driest parts:

	Per cent. (1930-31.)
Food grains . . . . .	77.3
Rice . . . . .	26.0
Wheat . . . . .	9.4
Barley . . . . .	2.4
Jowar } Millets . . . . .	29.7 { 11.5
Bajra } . . . . .	
Ragi } . . . . .	
Maize . . . . .	2.5
Gram . . . . .	5.8
Other grains and pulses . . . . .	11.2
Sugar . . . . .	0.8
Other food crops . . . . .	3.4
<b>Total Food Crops . . . . .</b>	<b>81.5</b>
Oil-seeds . . . . .	7.0
Cotton . . . . .	6.9
Jute . . . . .	0.05
Fodder . . . . .	3.75
Other non-food crops . . . . .	0.8
<b>Total Non-Food Crops . . . . .</b>	<b>18.5</b>

*Rice.* Rice is easily the most important food-grain in India, occupying, as the preceding table shows, a third of the area devoted to food-grains and a quarter of the total cropped area. It is the staple food-grain in all the wetter parts of India; almost the sole grain where the rainfall is more than 80 inches; still



TABLE SHOWING THE RELATIVE IMPORTANCE OF THE MAIN CROPS OF INDIA.

Crop.	Acreage (millions), 1926-27 to 1930-31.		Yield (millions of metric tons). British India (av. 1929-32).
	British India.	Native States.	
Food grains . . . . .	199.4	48.5	—
Rice . . . . .	79.2	3.6	48.4
Wheat . . . . .	24.6	5.9	9.5
Barley . . . . .	6.9	1.1	2.4
Jowar . . . . .	21.8	14.4	—
Bajra . . . . .	13.6	6.4	—
Ragi . . . . .	3.9	2.8	—
Maize . . . . .	6.1	2.2	2.4
Gram . . . . .	13.5	4.9	—
Other grains and pulses . . . . .	29.7	7.2	—
Sugar . . . . .	2.8	0.2	—
Other food crops . . . . .	7.9	2.8	—
Total Food Crops . . . . .	209.9	51.4	—
Oil-seeds . . . . .	16.2	5.7	—
Linseed . . . . .	2.1	0.7	0.4
Sesamum . . . . .	3.5	1.4	0.5
Rape and mustard . . . . .	3.5	0.4	—
Groundnut . . . . .	4.9	0.9	2.75
Coconut . . . . .	0.6	0.7	—
Castor . . . . .	0.5	0.9	—
Other oil-seeds . . . . .	1.1	0.7	—
Cotton . . . . .	15.5	6.8	0.85
Jute . . . . .	3.3	—	1.5
Other fibres . . . . .	0.7	0.2	—
Indigo . . . . .	0.07	—	—
Opium . . . . .	0.05	—	—
Coffee . . . . .	0.1	0.1	35.2 in lb.
Tea . . . . .	0.7	0.05	409 in lb.
Tobacco . . . . .	1.1	0.2	0.61 metric tons
Fodder . . . . .	9.1	3.5	—
Other non-food crops . . . . .	1.8	1.2	—
Total Non-Food Crops . . . . .	49.0	18.0	—

the most important with a rainfall of between 40 and 80 inches. Where the rainfall is less than 40 inches it can only be grown, generally speaking, with irrigation. Although considered botanic-

ally as a single species, there are many hundred varieties of rice, differing in the colour, size and shape of the grain, in the height of the stalks and in the climatic and edaphic requirements of the plant. The existence of numerous varieties in India is due, in large measure, to the conservatism and ignorance of the native cultivators, who go on growing a particular, often inferior, variety merely because their forefathers did before them. Incidentally the conservatism of the consumers, who demand a particular variety, is equally marked. The numerous

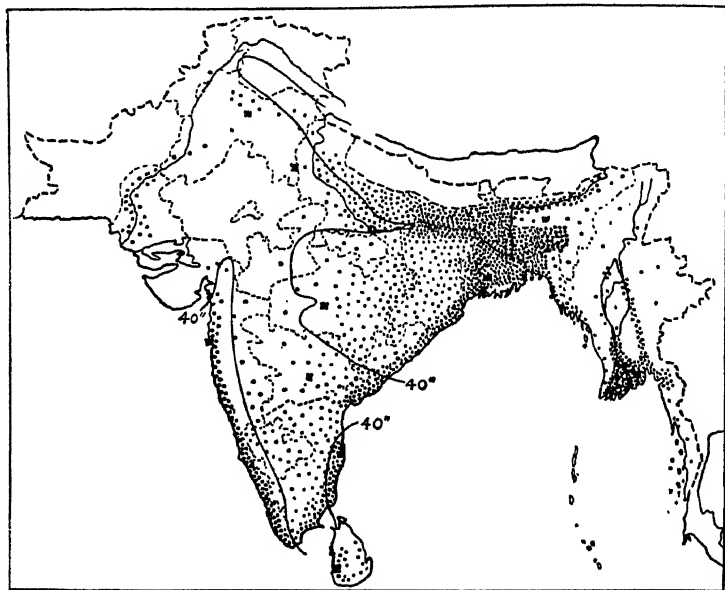


FIG. 94.—Map showing the distribution of rice in India.

Each dot represents 50,000 acres sown. The squares show, for purposes of reference, the positions of the capital town of each province. The lines shown are the 40-inch annual isohyets and demonstrate that rice is unimportant where the rainfall drops below 40 inches. This distribution map, like those for other crops in this section, has been constructed from figures given in *Agricultural Statistics, 1920-21*, for reasons explained in the footnote on p. 207, but may be taken to show the average post-war position.

varieties fall into two main classes, of which the second is by far the more important :

- (1) Upland or hill rice (which can be grown on hill slopes).
- (2) Lowland or swamp rice (which requires level, flooded fields).

Except in Burma practically the whole crop is grown for local consumption. Rice in the husk is known as paddy (sometimes written padi) ; indeed, in Eastern lands generally the word rice is little used, and one invariably refers to paddy fields

and paddy cultivation. The polished rice so familiar in Western lands is never seen in the East, where rice is merely husked and skinned. The paddy grain is sown under water and for the first few weeks of its existence the young rice plant grows under standing water. As the time of ripening approaches, gradually less and less water is required. The great river deltas and alluvial plains thus form ideal rice-lands. The presence of an impervious layer just below the surface is important for retention of the water. In hilly country the slopes must be carefully terraced before the necessary flat fields are obtained. There is little evidence in India of any modernization in rice culture. Whether in hilly or flat country, the native cultivators choose one small field as a 'nursery', from which the tiny plants when about 6 inches high are transplanted, by hand, in small bundles in rows in the flooded fields. The labour involved is obviously enormous, more especially when one remembers that the ploughing is done by a small wooden plough drawn by a couple of slow-moving oxen or water buffaloes. Reaping is also by hand. The growth of the rice plant when flooded is extraordinarily rapid—even 6 or 9 inches in twenty-four hours—and given great heat ripening is so rapid that as many as five crops from one area can be obtained, though in India, owing to the marked seasonal rhythm, a single crop is the rule. Rice in India is mainly a summer crop; it is planted towards the end of the rains and is ready for reaping, according to the locality, between November and February.

India's export of rice is almost entirely from Burma. Rangoon handles most of the trade, with less from Bassein. The direction of the export varies; frequently a large percentage goes to other parts of India to make up deficiencies. Exports 1926-27 to 1930-31 were valued at an average of 30½ crores, going mainly to Ceylon, Germany, Straits Settlements and Sumatra. In 1930-31 exports were valued at 26 crores.

*Wheat* has become the favourite food in the drier parts of Northern India. It is there a winter crop, so that the land can often be used for other purposes during the rest of the year. It is sown after the rains and ripens before the great heat commences. Wheat is especially important on the irrigated land of the Punjab, and disappears with increasing heat, moisture and rainfall down the Ganges Valley, but has spread a considerable distance southwards on the plateau—as far as the Dharwar district of Bombay. In normal years a surplus is available in the Punjab for export to Europe via Karachi. The pre-war export disappeared during the War and post-war years, but has again assumed considerable proportions. But even the wheat

is grown primarily for home consumption; home needs must be satisfied before export. Hence the extraordinary variation in the export trade <sup>1</sup>:

	lakhs.		lakhs.
1916-17	Rs. 915 U.K., France, Italy.	1925-26	Rs. 360 U.K., Egypt.
1917-18	" 1,900 Egypt, France, Italy.	1926-27	" 271 U.K.
1918-19	" 675 Egypt.	1927-28	" 441 U.K., France, Belgium.
1919-20	" 20 —	1928-29	" 169 U.K., Belgium, Egypt.
1920-21	" 410 U.K., Egypt, Germany.	1929-30	" 21 U.K.
1921-22	" 147 U.K., Germany.	1930-31	" 194 U.K., Belgium, France.
1922-23	" 344 U.K.	1931-32	" 15 U.K.
1923-24	" 912 U.K.	1932-33	" 4
1924-25	" 1,719 U.K., Belgium, Egypt.		

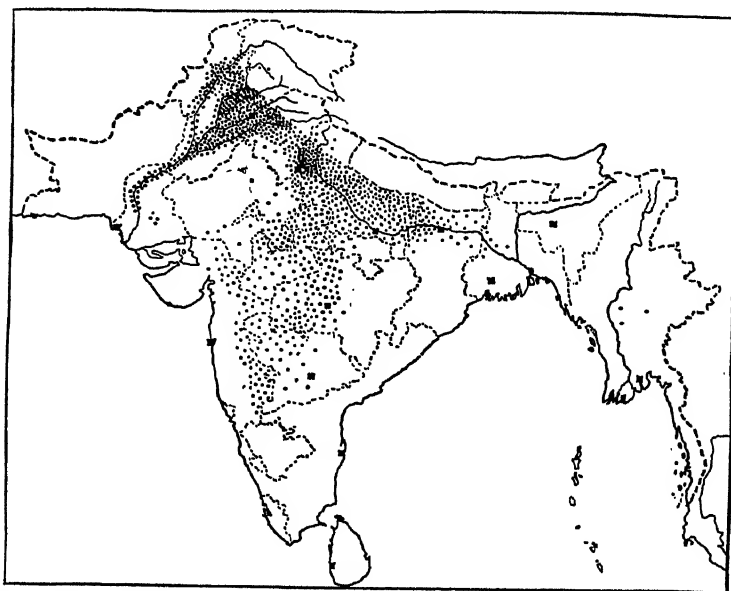


FIG. 95.—The distribution of wheat in India, showing the concentration in the Punjab and United Provinces.

Nearly all the wheat-growing regions have less than 40 inches of rain per year, but it should be noted that the crop is important mainly in the temperate parts of Northern India which have a marked cool season. In the north of the Punjab the wheat benefits considerably from the winter rainfall which comes at a time when it is required to 'swell' the grain. Each dot represents 20,000 acres.

Indian wheat is a hard wheat, formerly much appreciated by Italians for macaroni, but the United Kingdom now takes the bulk of the exports. This probably reflects the improving quality of Indian wheats now being grown, such as the variety known as Pusa-12.

<sup>1</sup> To these figures must be added a much steadier amount, since 1921-22, for wheat flour (average 120 lakhs).

In the last two or three years there has been actually a considerable import of wheat from Australia and even Canada.

*Barley* is almost co-extensive in its distribution with wheat.

*Millet* constitutes the staple food in nearly all the drier parts of India, occupying a fifth of the total cultivated area and more than a quarter of the area devoted to food-grains. It thus ranks an easy second to rice among Indian crops. There are three principal kinds—*cholum* or *jowar* (great millet), *cumbu* or *bajra* (spiked millet) and *ragi* or *marua*. Where the rainfall is less than 40 inches millet is everywhere important, and it

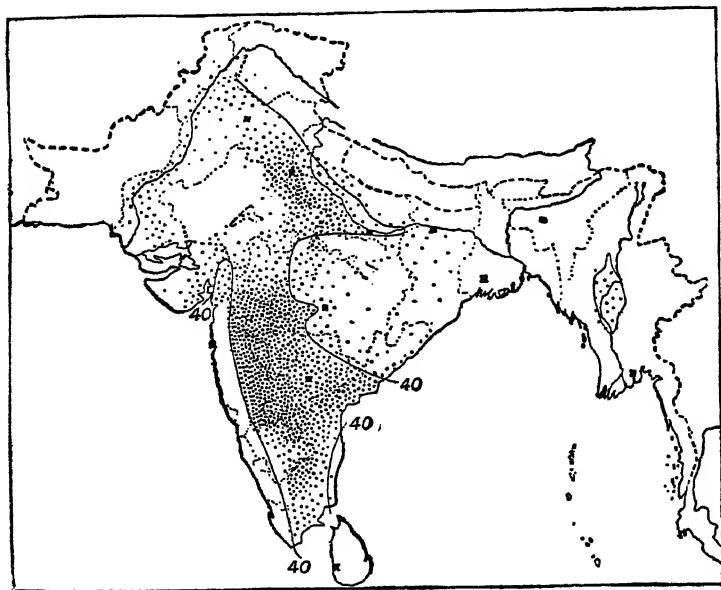


FIG. 96.—The distribution of millet in India.

Each dot represents 50,000 acres. The lines shown are the 40-inch isohyets and demonstrate that millet is essentially a 'dry zone' crop. This diagram refers to the two chief millets, jowar and bajra.

can be grown without irrigation even when the rainfall is as low as 20 inches. When the rainfall exceeds 40 inches it rapidly decreases in importance. Fig. 96 clearly illustrates this. Millet is grown entirely for home consumption; there has been a considerable tendency in recent years for it to be replaced by wheat wherever soil conditions will allow. The stubble left in the millet fields is important as cattle grazing.

*Maize* flourishes both on the plains and in the hills where the rainfall is moderate. It is grown as a subsidiary food-grain and for fodder in many parts of India, but only among

certain hill tribes is it the chief grain. It grows with millet in fairly dry regions and with rice in somewhat damper regions but it ceases to be important in such areas as the Lower Ganges Valley, where the rainfall exceeds 60 inches.

*Gram* (Chickpea) is the most important of the pulses and affords good human food as well as fodder for cattle and horses.

*Pulse* is used as a general term to include the edible seeds of various plants of the pea and bean family (Leguminosæ), just as grain is used to include the edible seeds obtained mainly from various members of the *Gramineæ*. Various pulses are grown in India; they afford nutritious food and a valuable variant to rice or millet, but are apt to be indigestible and to cause flatulence if eaten in excess. It will be seen that they cover a large area, and if miscellaneous grain is included the 'various grains and pulses' occupy third place after rice and millet.

*Sugar-cane* is grown in nearly all the provinces and States of India, but most comes from the irrigated lands of the Upper Ganges Plains and the Punjab. India is in a very curious position with regard to sugar. The climate is eminently suitable, and India has a huge agricultural population, to whom the labours attending sugar cultivation would be nothing new. The sugar industry was once one of the flourishing industries and until 1890 practically none was imported. Yet India now produces but a fraction of her requirements and imports huge quantities from Java. A Royal Commission has inquired fully into the question of extending sugar cultivation in India, but apparently with but little result.

*Other Food Crops.* Many of the most interesting and in some ways one might say the most characteristic of India's foodstuffs are cultivated on areas insufficiently important to be shown on a general table. The early traders sought especially the spices of India, and if there are two things which will ever remain in the present-day visitor's mind it will be his first Hindu dinner with its succession of hot curries and highly spiced foods and the galaxy of smells, spicy and otherwise, which greeted his nostrils from his first bazaar. Fields of *chillies* with the blood-red pods are a picturesque sight, but perhaps fail to excite admiration as much as the contemplation of one's Madrassi cook abstractedly chewing chillies as he prepares dinner. The best *pepper* in the world still grows on the rich, damp soils of the Malabar coast; the plant is a climber and is trained up tree-trunks. *Ginger* is obtained from the rhizomes or underground stems of *Zingiber officinale*, and grows especially in the rich, damp soil in the Presidencies of Bombay and Madras. *Nutmegs* and *cloves* also grow in India.

Numerous fruits are grown in India for local consumption ; the *mango* is perhaps the most delicious of all fruits when one has learnt to eat it respectably ; it is the fruit of a large evergreen tree, and is ready just before the rains break (hence mango showers). The *Jack fruit* also grows on a huge evergreen tree in wetter regions ; the *durian* is celebrated for its appalling smell. *Bananas* or *plantains* grow almost everywhere—a few plants near every hut or village ; *papayas*, with the consistency of soft soap and a rather disappointing flavour, are almost equally widespread. *Custard apples* and *mangosteens* deserve mention, but, apart from mangoes, the fruits of India lack the acidity which renders temperate fruits so refreshing. An exception must be made for the delicious small sweet *limes*, used fresh for making the most popular of soft drinks. Oranges, apples, pears and plums belong to the hills.

Among root crops *potatoes* are usually obtainable in Indian villages, so are *onions* and *sweet potatoes*, and various other vegetables such as brinjals, tomatoes, cabbages and turnips. *Coconuts*, to be mentioned later, are widely used as a flavouring matter in curries.

*Oil-seeds.* Turning to crops which are mainly 'non-food' crops, oil-seeds vie with cotton for pride of place as the most important. Between a quarter and half the crop is exported. *Sesamum* is a plant of the dry zone or intermediate areas ; linseed and rape do not flourish in the wettest parts. The oil obtained from rape is known as colza oil, which, before the extended use of mineral oil, was a favourite lamp oil. It is also used as a lubricant and for a variety of other purposes. The oil from sesame or *sesamum* is widely used in India for cooking and for anointing the body ; the portion exported is used in soap manufacture and the best kinds for margarine. *Linseed*, the seed of the flax plant which is grown in India, as in other tropical countries, not for its fibre but for its seed, is used for oil which is of especial importance in the manufacture of paints and varnishes. Special interest attaches to *ground-nuts*. The ground-nut, also known as the monkey-nut or pea-nut, is a small leguminous plant which grows about a foot high. The nuts are borne on the roots rather after the manner of potatoes. The 'nuts' are nutritious—largely used for food in America—and furnish a pale yellow oil closely resembling olive oil. It can be used as a substitute for olive oil as a salad oil, in the manufacture of margarine and especially in the manufacture of soap. But the real importance of the plant to India is that it thrives in very light sandy soils in dry regions—often where practically nothing else will grow. In 1911-12

it was not sufficiently important to be separately recorded in India; in 1912-13 it occupied only 394,000 acres. In 1930-31 it occupied 5,310,000 acres in British India alone—a larger area than any other oil-seed crop in India. This is one of the great triumphs of the Government Agricultural Department.

The importance of the coconut is not adequately indicated by the relatively small area it occupies. It is a denizen of the sandy shores of tropical lands, though it will grow in plantations some distance from the sea. Of all palms it is, perhaps, the most graceful, and is the one indissolubly associated with tropical scenery in the imagination of dwellers in temperate lands. The palm bears for a considerable part of the year, and 200 nuts per palm is not an unusual average. The thick outer covering of the nut is rarely seen abroad; it is stripped off by striking the nut sharply on an iron-pointed stake set up in the ground. The husks so obtained are left to rot in water for about six months—the lagoons behind the sandy seashores of Malabar and Ceylon are ideal for the purpose and the natives are born immune to smells—and the fibre or 'coir' beaten out by sticks or by machinery in modern plantations. Coir is very strong and is used for ropes, as matting, floor coverings and the stiffer parts for brushes and brooms. Copra is the dried white flesh of the nut. The nuts are cleft in two with a hatchet and exposed for a short while to the sun, when the flesh curls and separates from the shell. It is then dried either in the sun or in a special drying house. Coconut oil is now usually obtained by compression of copra; the residue forms the cattle food known as poonac. The oil is used in cooking and by the natives for the anointing of the bodies or hair. That exported is used, as are the other oils, in the manufacture of soap, margarine and candles. The kernel is also prepared in another way as desiccated coconut, for use in confectionery.

Mention must be made of cotton-seed oil, an important by-product in the cotton areas.

The residue from all the oil-seeds, after the expression of the oil, is valuable as cattle food.

The one important oil not yet mentioned is castor oil. It is especially valuable as a lubricant at low temperatures, as it does not solidify even with 30° of frost. This is one of the properties which make it valuable as a lubricant of aircraft. The medicinal oil—a great favourite with nearly all natives of India—is obtained from smaller seeds, there being two varieties of seed, large and small.

*Cotton.* India ranks second to the United States as a producer of cotton. The average output for the five years preceding the



Var (1909-13) was over three-quarters of a million tons—nearly 1,000,000 Indian bales of 400 lb. gross or 3,400,000 United States' bales of 500 lb. This is rather more than a quarter the United States' production. Cotton in India is a 'Dry Zone' crop, and is very largely restricted to the area with less than 60 inches of rainfall. There are three leading areas of production :

- (a) The black cotton soil of the north-western part of Peninsular India, forming the hinterland of Bombay. The high plains of Berar are especially important. The sticky, moisture-retaining soil is suited to the growth

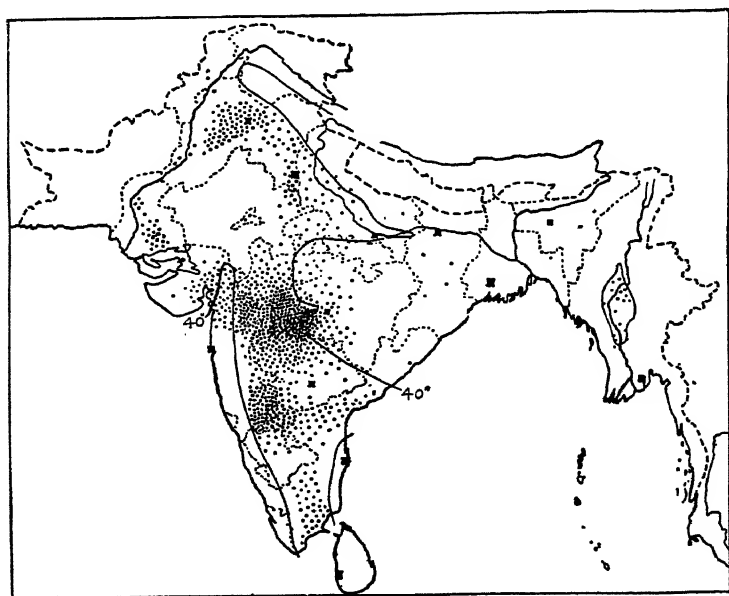


FIG. 97.—The distribution of cotton in India, showing the three principal areas mentioned in the text.

Each dot represents 20,000 acres.

of native cottons of short staple. The yield is generally low—less than 100 lb. per acre.

- (b) The fertile alluvium of the Indus and Ganges plains. When irrigated the American cottons, greatly superior to the native varieties, grow well.
- (c) The ferruginous soils of the South of India which, in parts of Madras, grow cotton of excellent quality.

An increasing proportion of India's cotton is being consumed by home mills, mainly at Bombay, but there is a large export to Japan and China and the countries of continental Europe (Italy,

Belgium, Germany, France). Indian cotton is not, as a rule sufficiently good to meet the requirements of Lancashire manufacturers. The acreage under cotton has fluctuated widely in recent years—perhaps more widely than that of any other India crop of first importance. This reflects, very largely, conditions in the world's cotton markets. Acreage under cotton in British India :

1906-07 to 1910-11	.	.	.	.	13,652,000
1911-12 to 1915-16	.	.	.	.	14,241,000
1916-17 to 1920-21	.	.	.	.	14,623,000
1921-22 to 1925-26	.	.	.	.	15,247,000
1926-27 to 1930-31	.	.	.	.	15,468,000
1931-32 to 1934-35	.	.	.	.	13,600,000

Estimated total for the *whole* of India, 1934-35, 22,600,000 acres.

Much attention has been given in recent years to the improvement of Indian cotton, especially by the Government Agricultural Department. Repeated experiments have proved the difficulty of establishing exotic varieties on the great cotton soil areas and research has therefore been directed to the improvement of existing Indian varieties. Obstacles are numerous. Rapid degeneration of varieties improved by selection has caused the already conservative farmer to lose faith; the conservatism already noted in connection with paddy-farming and carelessness in the mixing of seed are other potent factors.

Reference will be made later to cotton manufacturing geographically it is interesting to note that, although cotton exported in large quantities through both Bombay (rainfall 80 inches) and Karachi (rainfall, 10 inches), owing to the dryness of the atmosphere cotton mills cannot be established at Karachi to rival those of Bombay.

*Jute.* Jute is the cheapest of the common fibres, and from its use in the manufacture of cheap wrapping canvas, bags, etc. it is often referred to as the 'brown paper of the wholesale trade'. The fibre is weaker and less durable than flax or hemp, and somewhat easily rotted by water. It does not bleach, but is easily dyed. The jute plant (*Corchorus capsularis*) is raised from seed, and grows to a height of 10 or 14 feet. It grows best in well-drained soil; in muddy swamps the plants are taller but the fibre is coarser. In the Ganges Delta, which yields over nine-tenths of the world's jute, the seeds are sown in March or April; in August or September the plant is ready for cutting. The first process in the preparation of the fibre is retting in

<sup>1</sup> Cambodia cotton, however, is firmly established in Madras and Egyptian cotton grows well in Sind.

stagnant water, after which the fibre is stripped from the stem by hand, washed and dried in the shade before being sorted, graded, and baled. The yield is about 11 cwt. of fibre per acre.

Originally the preparation of jute was a peasant industry in Bengal and the fibre was used for making clothes. Its 'discovery' as a substitute for hemp dates from 1832, and was made by a Dundee merchant. The jute trade developed along with the international trade in grain, since one of the principal uses of the fibre is in making sacks for grain. About half of India's jute is now manufactured into 'gunny cloth' locally in mill towns north of Calcutta; the other half is exported,

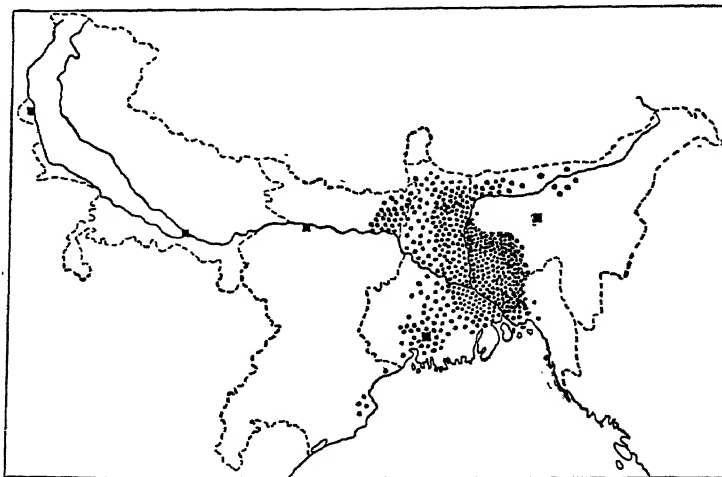


FIG. 98.—The distribution of jute in India, showing the remarkable concentration of the bulk of the world's acreage in Bengal and the neighbouring parts of Assam and Bihar and Orissa.

The area of heaviest production is in Eastern Bengal on the 'new delta', some distance from the jute-mill towns north of Calcutta (shown by a square dot). Each dot represents 5,000 acres.

mainly to Great Britain—where hessian canvas and other jute fabrics are made at Dundee and Barnsley—to the United States and elsewhere.

Fig. 98 shows the area of production. Acreage slumped in the years following the War, but in 1926-27 was nearly 4,000,000 acres, only slightly below the pre-war average. It was feared at one time that the bulk handling of grain would kill the jute trade. Acreage in 1931-32 reached a low level of less than 2,000,000.

*Other fibres* obtained in India include hemp and kapok.

*Indigo.* From time immemorial the art of dyeing has been practised in India, and it has been ascertained that some of the mummy cloths of the ancient Egyptians are embroidered with

blue threads—dyed with indigo undoubtedly brought by Arab merchants from India. Indigo is, *par excellence*, the Indian dye. The indigo plant is a small shrub, but is usually grown as an annual from seed in very carefully prepared soil. Sowing, in Bengal and Bihar, takes place early in March, and the precarious crop, easily spoilt by too much or too little rain, is normally ready for cutting in the middle of June. The plants are stacked in steeping vats and covered with water. After about ten hours the water, now bright orange, is run off into the beating vat and beaten by hand or churned by machinery. During this process it changes in colour, at first to green, then to dark blue. The indigo is allowed to settle, the water is run off and the colouring matter is boiled and finally the pulpy mass is pressed, cut into cubes and dried.

Broadly speaking, modern coal-tar dyes have killed the indigo industry. During the War, when German dyes were difficult to obtain, the area under indigo rose temporarily to 765,000 acres (1916-17), but in general has steadily decreased, reaching the lowest recorded level of (up to 1931-32) 52,500 acres in 1931-32—less than a twentieth of the area twenty-five years before. Madras and the Ganges Valley in the United Provinces and Bihar, also the Punjab, are the seats of the indigo industry.

*Opium.* Opium is the dried juice of the opium poppy (*Papaver somniferum*). Incisions are made at sunset in the unripe capsules of the poppies and by morning the milky juice has hardened to a brown substance—the opium of commerce. Morphine is an extract of opium and is, of course, a very valuable drug, producing sleep and insensibility to pain. In the public mind opium is associated with its abuse in China, and India with its share in supplying this harmful drug to Chinese markets. The history of the opium traffic is a happy hunting-ground for politicians of all creeds. The present position, at any rate, is that Indian exports of opium have ceased, except as is consistent with legitimate medical requirements vouched for by the Governments of the importing countries. In the interests of human progress the Indian Government has thereby voluntarily given up a vast revenue and the Indian agriculturist has been robbed of a lucrative crop. From 615,000 acres in 1906-07, the area occupied by the opium poppy reached its lowest level in the last years of which records are available—43,000 acres in 1930-31. Poppy cultivation is now a Government monopoly. The old Indian centres are the Ganges Valley (Ghazipur and Patna) and the Malwa Plateau. Cultivation is now almost entirely restricted in British India to Ghazipur (U.P.). The total export in 1930-31 was 4,792 chests, valued at 1,90,79,000 rupees.

₹1,400,000), being 1,460 chests to the Government of the Straits Settlements, 1,321 to the Government of Indo-China and 1,044 to the Siam Government. Only one case was consigned to a private merchant. These figures should be compared with the export of 1,000 chests to China alone in 1907.

*Coffee.* The once lucrative and extensive coffee-planting industry of Mysore and Southern India was virtually annihilated by disease, and exists now only on a minor scale in Mysore and the Nilgiri Hills and especially in the little province of Coorg.

*Tea.* The tea of commerce is obtained by drying the leaves of a small evergreen shrub, *Thea camellia*, a native of South-eastern Asia. The shrub requires a deep, fertile soil very well drained, as stagnant water in the soil is particularly harmful. Soils of recently cleared forest land are excellent, but provided the drainage is good, tea grows well on valley lands, as in Assam. The tea shrub may be classed as a sub-tropical plant, but is a very hardy plant and, provided the growing season is long, warm and moist, is not injured by winter frost. Left to itself, it grows to the size of a small tree, but when grown for tea it is pruned every year in the spring to form a bush 3 or 4 feet high. Some weeks after pruning young shoots appear, and when the leaves reach a certain size they are picked. Another crop of leaves, or 'flush', occurs later, and others at intervals of a week or ten days during the season. There are three or four pickings in China, sixteen in Assam, and even more in Ceylon during the season. An abundance of cheap labour is obviously essential for the picking of the leaves the moment they are ready, especially as the various flushes afford tea of differing quality and a delay in picking affects quality. After gathering, the leaves are withered (by being spread out on wire trays and dried), rolled, partly fermented, dried, and sifted.

Until about 1850 China supplied the entire commercial crop of the world. About that date Assamese supplies commenced to be important, and Assam now supplies nearly half the world's export. Assam is believed by many to be the original home of the tea plant, and it was discovered there growing wild when the first attempts to make plantations were made nearly a century ago. The plantations are situated on the hilly slopes on either side of the Brahmaputra Valley and, of recent years, have extended in the valley itself. They stretch westwards into Northern Bengal around Darjeeling, and another important area is on the southern slopes of the Garo and Khasi Hills in Assam near Sylhet. The other tea-growing area of India is in the extreme south. Amongst the Nilgiri Hills and the hills of Travancore the delicately flavoured aromatic 'China' teas can be, and are now, grown in India.

**Tobacco.** Although India ranks next to the United States in the quantity of tobacco grown, it cannot be described as a cash crop. Native methods of curing do not suit European tastes, and, further, the production is only sufficient to satisfy home demand. The tobacco plant is widely distributed; the quality and character tends to vary according to soil. Heavy soils produce strong tobacco and light ones mild. Tobacco (*Nicotiana tabacum*) is a handsome annual with large, broad leaves, covered with tiny hairs, and grows to a height of several feet. The flower shoot is nipped off in order that the strength may go to the leaves. Much of the Indian tobacco is grown on alluvial soil; often on the banks of mud and silt left by the river after the flood season is over. Bombay, Madras and the Punjab rank among the great producing provinces.

**Fodder.** The enormous numbers of cattle in India consume huge quantities of food and in nearly all the dry parts this has to be specially grown. Hence fodder occupies 3.6 per cent of the total area of cultivated land. Various leguminous plants are the favourite fodder plants as well as millet and other grains.

**Other Crops.** Other non-food crops in India include cinchona (quinine), of which there are plantations in Sikkim and Southern India; rubber, of which there are extensive plantations in Tenasserim (Lower Burma), Travancore and the extreme south of Madras—always in wet regions.

**The Position of Agriculture in India.** It is undoubtedly a fact that the position of agriculture in India at the present time is far from satisfactory. It is impossible, in view of the limitations of space, to go into the many and complex questions involved. Moreover, to do so would take us far beyond the field of purely geographical inquiry. It is difficult also to avoid contact with the burning political problems of the day. Broadly speaking, the erstwhile agricultural organization of India has been thrown severely out of gear by the universal march of progress—or, to avoid wounding susceptibilities, let us say the universal economic changes. It is inconceivable that India could have remained aloof from the world, but it happens that the changes have taken place during the period of British influence in India. Hence the British Government in India is frequently blamed for happenings inevitable and far beyond its control—or the control of any Government. From the one side its shortcomings are emphasized; its achievements passed lightly over from the other side its shortcomings are excused and its achievements perhaps unduly lauded. One needs to read side by side such a book as Lord Ronaldshay's *India, a Bird's-eye View* (Constable, 1924), and a book written from the Indian stand

oint like Wadia and Joshi's *The Wealth of India* (Macmillan, 925); then perhaps to dip into the mass of evidence offered to the Royal Commission on Agriculture in India (various volumes, 927) and to note the divergence of opinion offered by Indian and European alike.

Without venturing to attempt explanations or to suggest remedies, some of the outstanding features of Indian agriculture may be noted.

The yield per acre of almost every crop in India is exceedingly low—in nearly every case far below the world averages<sup>1</sup>:

Crop.	India.	World.	Typical Country with Good Yield.
Wheat . . . .	10½ bushels	15 bushels	Canada, 17 Denmark, 42
Barley . . . .	17 „	18 „	Canada, 25
Maize . . . .	13½ „	21 „	United States, 24
Rice . . . .	1,428 lb.	1,576 lb.	Italy, 4,760; Japan, 3,470
Cotton . . . .	52 lb.	94 lb.	United States, 107
Linseed . . . .	385 lb.	660 lb.	Egypt, 248
Jute . . . .	740 lb.	742 lb.	Egypt, 1,119
Sugar-cane . . . .	10 tons	30 tons	Japan, 865 Java, 40

What are the causes of the admittedly low yield of Indian crops? India is richly endowed by Nature in the matter of soil and climate—vast areas of fertile, alluvial land and a comparatively small area of useless mountain land (contrast China). Among the causes are:

(1) Soil exhaustion. The land is being continuously impoverished owing to the lack of manure and the uninterrupted cultivation of heavy and exhausting crops. Despite the huge number of cattle, it is well known that the Indian agriculturist does not use cow dung as manure but as fuel. The dung is picked up and plastered in cakes on the walls of the houses so that it may dry in the sun. What a contrast to China!

(2) Export of natural manures. This export is mainly in the form of oil-seeds, which contain a large proportion of the nitrogenous fraction of the soil.

(3) Uneconomic farming due to subdivision and fragmentation of holding. Excessive subdivision is a common feature of village life throughout India: it is mainly the result of Hindu and Mahommedan laws of inheritance causing the division of land

<sup>1</sup> Figures of world yield from statistics published by the International Agricultural Institute. Based on nine-year averages, 1924–32, selected as being years of normal conditions.

among the heirs. Fragmentation refers to the land held by any one owner being in a number of small fragments. There are many areas where a field of half an acre is divided between twenty separate owners.<sup>1</sup>

(4) Agricultural indebtedness and consequent poverty. Probably only about one-fifth of the Indian agriculturists are free from debt, a third or more so heavily involved that escape is absolutely impossible.

Broadly, it seems that the whole thing works in a vicious circle. Small holdings result in uneconomic farming,<sup>2</sup> which leads to extreme poverty, indebtedness and the sale of food commodities and oil-seeds; sale of food and oil-seeds is impoverishing the soil and keeping the farmer undernourished. Poor and undernourished, he cannot purchase manure, modern farming apparatus, or increase his land-holding to a size which permits economic farming. Yet India's progress depends upon an increase in the standard of living and an increase in the purchasing power of the masses. We have mentioned once or twice the conservatism of the Indian agriculturist. Actually he has little chance to be anything else. He cannot improve his land and increase his yield by manuring—he has not the initiative wherewithal.<sup>3</sup>

Much emphasis is laid by some Indian economic writers on the iniquity of India's export of foodstuffs and raw materials. Actually the export of foodstuffs is rather over-emphasized. Out of a total yield of 47,100,000 tons of rice, wheat and millets—the average for 1926-31,—total exports averaged about

<sup>1</sup> It must, however, be explained that there are two types of land tenure in India. In Bengal, Bihar, United Provinces, Punjab and Central Provinces zamindari tenure prevails. Single proprietors or proprietar brotherhoods possess large estates of several hundreds or thousands of acres and the State land revenue is payable on each estate as a whole being assessed at about one-half of the rental. In Bombay, Madras, Assam and Burma raiyatwari (or ryotwari) tenure prevails. Each petty proprietor holds directly from the State, and, as a rule, cultivates his own piece of land.

<sup>2</sup> In Bengal, to take a typical province, there are 11,000,000 cultivators (actual workers) to farm 24,500,000 acres—less than  $2\frac{1}{4}$  acres per cultivator. In England before the days of mechanical appliances there were 17 acres per cultivator (1851).

<sup>3</sup> This is the gloomy side of the picture, and the vastness of the problem is apt to blind one as to what can be accomplished. Educational propaganda of the right type could achieve marvels, and of this a proof is afforded by the record contained in that remarkable and stimulating book, *The Remaking of Village India*, by F. L. Brayne (Oxford University Press). If there is a philanthropist who really wants to do something for the masses of India he could not do better than to institute a fund of half a million pounds and place Mr. Brayne in charge of it.



367,000 tons, the bulk of which was rice (2,133,000 tons), mainly from Burma where it really is a surplus. The argument is, of course, that the Indian agriculturist—and the coolie in the towns—lives on what is a bare subsistence diet, bordering on starvation the whole time. A very rough estimate shows that the 272 million people of British India consume rather over 45 million tons of grain per annum— $3\frac{1}{2}$  cwt. or 370 lb. per head. This is equivalent to roughly  $1\frac{1}{2}$  lb. of grain *and pulse* per day for every man, woman and child. In comparing this figure with other countries it must be borne in mind that the grain constitutes the bulk of the food consumed.

It is held by many Indian economists that export of grain, oil-seeds and raw materials should cease, that much of the land devoted to such raw materials as cotton and jute should be released for foodstuffs, that the cotton and jute actually produced should be consumed entirely in Indian mills which would therefore increase the industrial population in the towns and relieve the pressure on the land. The relief of the pressure on the land would permit increase of holdings, adoption of modern economic methods of farming, and thus increase the wealth and purchasing power of the agricultural masses. This envisages an India surrounded by high tariff walls and an almost complete destruction of Indian foreign trade.

**Live-stock.** A census of live-stock is now taken in British India every five years. The first general census was in 1919-20, the third in 1929-31. The live-stock may be divided into three broad classes—bovine (oxen and buffaloes); ovine (sheep and goats); and others (horses and ponies, mules, donkeys and camels). The following is a summary for British India:

NUMBER IN THOUSANDS, 1930-31.

Bovine.	Ovine.	Others.	Ploughs.	Carts.
152,868	61,039	4,398	25,429	6,716

There is thus, in British India, 62 cattle per 100 of population, which approximates obviously to an average of a pair of bullocks or buffaloes to each agriculturist and his family. The number of cattle is also equivalent to 67 per 100 acres cultivated—a pair of bullocks to do the work of ploughing 3 acres.<sup>1</sup> It will be noticed that there is only one plough per six animals—the ploughs are shared.

It must be emphasized at once that live-stock occupies a position in the agricultural economy of India which does not bear comparison with any European country or with America.

<sup>1</sup> Perhaps this is misleading, as it includes young stock and cows. There are 51,271,000 bullocks and male buffaloes, almost exactly two to every plough and two for each nine acres to be ploughed.

The bullock or buffalo is primarily the motive force for the plough and the draught animal. The honours of the plough or cart are frequently shared by the cow. The essential equipment of the peasant farmer includes a pair of bullocks or buffaloes to do the ploughing and draw the cart; a cow to propagate the species (services of a bull are shared) and quite secondarily to give milk.

*Oxen.* The characteristic cattle of India are the large white humped bullocks. In Burma are the smaller brown cattle, but also humped. According to statistics published by the Department of Statistics there has been a very marked increase in the number of oxen in British India—from 78,000,000 in 1906–07 to 121,000,000 in 1930–31. The latter numbers represent 3·8 per cent. bulls, 39 per cent. bullocks, 31·4 per cent. cows and 26 per cent. calves. Though widely distributed, 20 per cent. of the oxen are in the United Provinces, and it is there and near Bombay particularly that an attempt has been made to develop dairying. Otherwise, although the natives use milk, the yield of milk is valued at about a farthing per cow per day. Incidentally, milk in a city like Bombay is dearer and poorer than in any great city of Europe or America, and in many cases is adulterated and dirty. The bull is sacred to the Hindu—a position which is little to be wondered at seeing the importance of the ox in his everyday life. Hindus do not therefore eat beef and the consumption of meat in the whole of India is but slight. The dish of delicacy amongst Europeans, by way of contrast to the cold shoulder of mutton, is cold hump. The hide is a valuable part of the animal.

*Buffaloes.* In 1930–31 there were 31,300,000 buffaloes—5,500,000 male, 14,700,000 cows, and 11,200,000 calves. The buffalo is heavier and stronger than the ox, but slower. Although at home in wet lands—whence the name water-buffalo—and never so happy as when wallowing in a mud pool, or standing in water with his long horns floating on the surface of the water and keeping just the nostrils above the stream—the buffalo is also found in numbers in the drier parts of India as well as in the wetter. The young buffaloes are covered with brown hair which they lose as they grow old, and the adult buffalo is an ugly pig-like animal with a doubtful temper and a rooted objection to Europeans. Buffaloes are most numerous in the United Provinces, the Punjab, Bihar and Madras.

*Sheep.* Comparatively speaking, sheep are not very numerous in India, though there were 25,300,000 in 1930–31 in British India. They live mainly on the dry hills, where the pasture is insufficiently good for cattle. Nearly half the total are in Madras and they are fairly numerous in the Punjab. Outside British

India there are 7,000,000 in Mysore and Hyderabad alone. The sheep of India are poor and yield neither good wool nor good mutton, and the skin is often the most important part.

*Goats.* Goats are to be found everywhere in India, for they live on the poorest pasture and seem to find sufficient to sustain life even in the driest parts. There are nearly 40,000,000 in British India alone—20 per cent. in Madras, nearly 20 per cent. in the United Provinces. There is a large export trade in goat skins.

*Horses and Ponies.* There are less than 1,600,000 horses

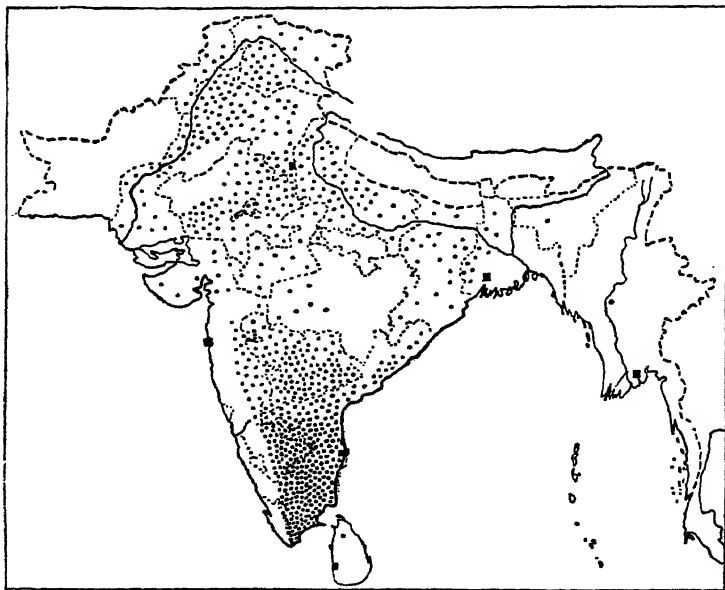


FIG. 99.—The distribution of sheep in India.

Each dot represents 50,000 sheep (based on 1930-31 figures).

and ponies, including young stock, in British India. Obviously they are not used as plough animals. They are most numerous in the United Provinces, and are used specially for small carts.

*Mules and Donkeys.* Mules and donkeys are very valuable in hilly regions, being sure-footed, and are almost as valuable as camels in very dry regions. Mules only number 70,000—relatively negligible—but donkeys reach a total of 1,400,000. More than half the donkeys are in the dry regions of the Punjab and North-west Frontier.

*Camels.* The 505,000 camels in India afford a most interesting

example of climatic control of distribution. Fig. 100 needs no further comment.

*Elephants.* It is easy to exaggerate the importance of the elephant whose main use in India to-day is in the forests and timber yards. One of the joys of India is to

‘ See the elephants piling teak  
In the sludgy-wudgy creek ’;

and they have their uses as beasts of burden in forest country

**The Population of India.** A Census of the whole Indian

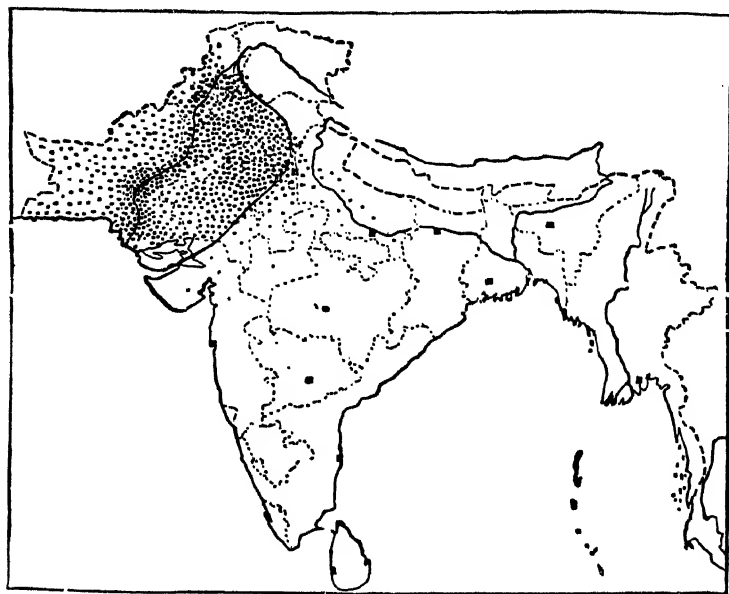


FIG. 100.—The distribution of camels in India.

Each dot represents 1,000 camels. The line shown is the 20-inch annual isohyet and demonstrates the concentration of camels in the very dry regions.

Empire, British India as well as Indian States, is taken every ten years, the last having been in 1931. Care must be taken in comparing figures given in successive censuses because of the variation in area considered. The total area considered by the 1931 census was 1,808,679 square miles, with a population of 352,837,778, giving a mean density for the whole of 195. The area of the British Provinces is 1,096,171 square miles, with a population of 271,526,933 (density, 248); of Native States, 712,508 square miles, population 81,310,845 (density, 114).

The distribution illustrates extraordinarily well the influence of geographical factors.

- (a) Physiographic influence : the population is densest in the lowlands and high plains.
- (b) Geological or edaphic control : the population tends to be concentrated on the great tracts of alluvium.
- (c) Climatic control : the effect is obvious in the desert regions and Baluchistan but is obscured elsewhere by the extensive use of irrigation.

There are two anomalies : the under-populated character of the whole of Burma and the low density in the Assam Valley.

For a whole province the highest density (if we except the small province of Delhi) is reached in Bengal, 646 ; for a State, 814, in Cochin. In the large 'natural regions' adopted for

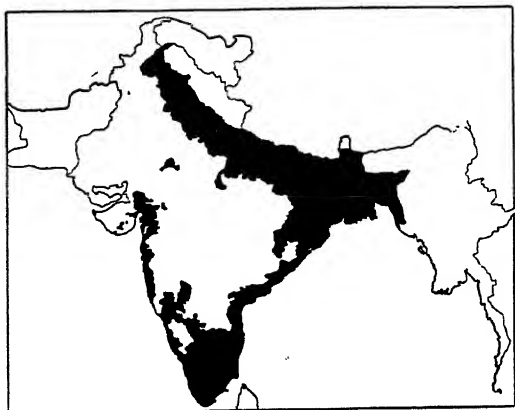


FIG. 101.—The distribution of population.

All parts shown in black have a population density exceeding the average for the whole of India of 195 per square mile. This map demonstrates the concentration in the lowlands, especially in the great alluvial plains.

Census purposes, Eastern Bengal records 935, and the eastern plain of the United Provinces 753. In a few districts of Eastern Bengal and elsewhere—excluding urban areas—the density may exceed 2,000. Three-quarters of the Indian population are agricultural, hence the pressure on the soil is very great ; but India, generally speaking, has nothing to compare with the dense agricultural populations of many parts of China.

The Indian population is increasing. Eliminating territorial changes the rate per cent. of real increase has been—

	Per cent.
1872-1881 . . . . .	1.5
1881-1891 . . . . .	9.6
1891-1901 . . . . .	1.4
1901-1911 . . . . .	6.4
1911-1921 . . . . .	1.2
1921-1931 . . . . .	10.6

In the last decade the increase was from 318,942,480 to 352,837,778—an almost incredible increase of nearly 34,000,000.

The influenza epidemic of 1918-19 accounted for between 12,000,000 and 13,000,000 victims—probably worse than a plague India has known and more than equal to the mortality from plague from 1898-1918. This explains the low percentage increase in the decade 1911-21.

The population of India is predominantly rural. Only 10 per cent. of the population live in towns of 5,000 inhabitants and over. India had, in 1931, only thirty-eight towns with over 100,000 inhabitants and only sixty-five towns with between 50,000

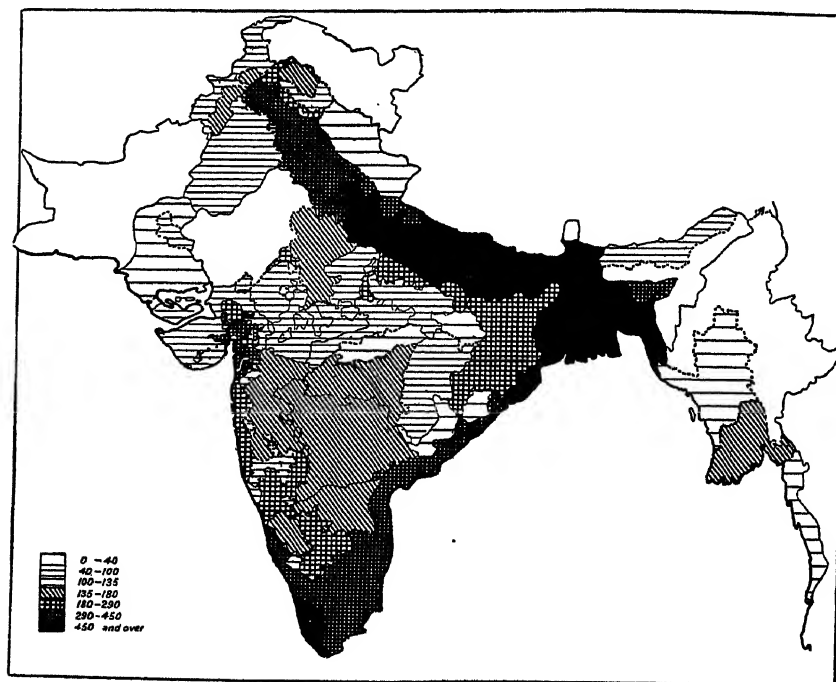


FIG. 102.—The population of India—density in 1921.

and 100,000. Despite the industrialization of India which is going on, no less than 25 per cent. of the larger towns showed a decrease in size from 1911-21, but nearly all increased in size in the decade 1921-31. Amongst the important lines of movement in India are—

- (a) The stream of labourers, temporary and permanent, from the rural areas to the industrial areas of Bombay and Calcutta.
- (b) The stream to the tea gardens and vacant land in Assam.

(c) The stream to the rich and under-populated province of Burma.

The migrants come especially from Bihar, the United Provinces and Madras.

**The Races of India.** It is impossible, in the space available, to deal even in the most cursory manner with the races of India, and no attempt will be made to do so. In the words of Lord Ronaldshay<sup>1</sup>: 'Imagine a region the size of all Europe exclusive only of Russia, with a population of

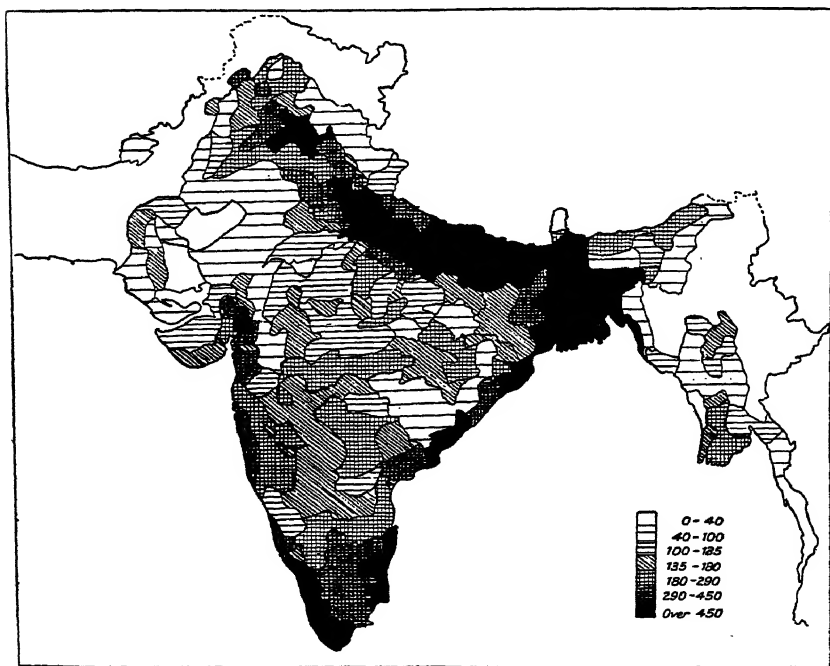


FIG. 102A.—The population of India—density in 1931.

320,000,000 practising nine great religions and speaking 130 different dialects<sup>2</sup> belonging to six distinct families of speech. That is India looked at from the point of view of the statistician. But statistics are dry bones. If their meaning is to be grasped they must be seen clothed with flesh and blood. And that means hard and extensive travelling. When within the space of a few months, for instance, one has

<sup>1</sup> *India: a Bird's-eye View.*

<sup>2</sup> The Census Report of 1921 gives 222 Indian vernacular languages.

been brought into contact with the business-like Parsi of Bombay, the indolent and easy-going Burman, the courtly and cultured Brahman of Southern India, the primitive Kohl or Bhil of the jungles of Central India, the emotional and subtle-minded inhabitant of the towns of Bengal, the cheery hill-man of the Eastern Himalayas, the great landowners of the United Provinces and the Punjab, the proud aristocracy of

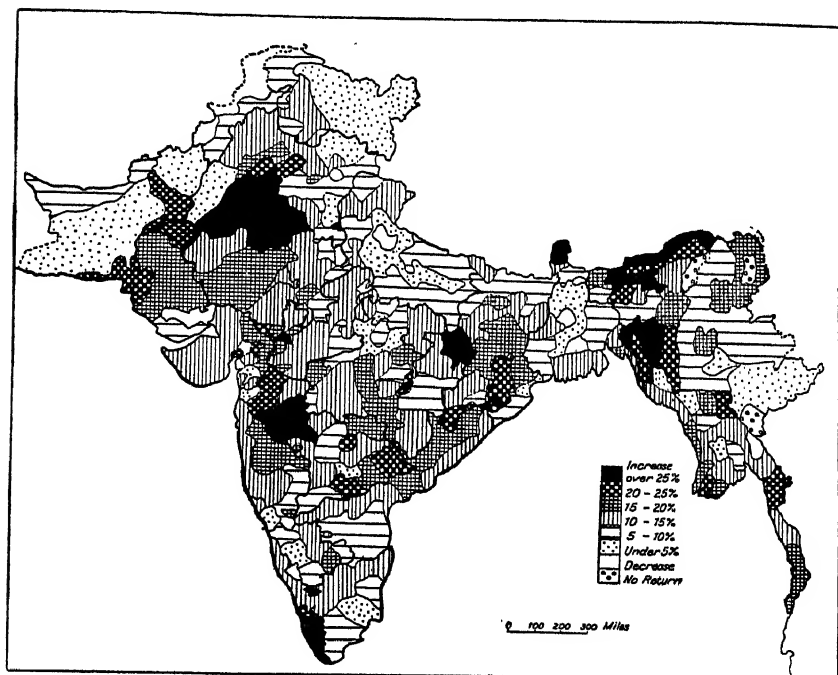


FIG. 102B.—Population changes in the decade 1921-31. Notice that the areas of greatest increase are in the regions where irrigation facilities have been improved and in the 'new lands' of Assam.

Rajputana, the wild Afridi of the North-West Frontier and the picturesque chieftain of Baluchistan, then it is that statistics as to race and language begin to assume definite meaning and reality.'

Perhaps the most fundamental of all difficulties in trying to get a simplified conception of the peoples of India is the difficulty of disentangling differences due to race, language, religion and culture. One finds oneself talking or thinking in one sentence of Dravidians, Bengalis, Parsis, Brah-



nans and Tamils as if they were comparable divisions of the people.

*Race.* In the dim and unchronicled past, it is legitimate to suppose that India was inhabited by wild, uncivilized tribes, which we may call the pre-Dravidian peoples. Then India was invaded by the Dravidians—dark-skinned, broad-headed peoples with broad, flat noses in some respects reminiscent of negro races. As the Dravidians spread in India they drove the pre-Dravidians to the hills and the forests, where a few still

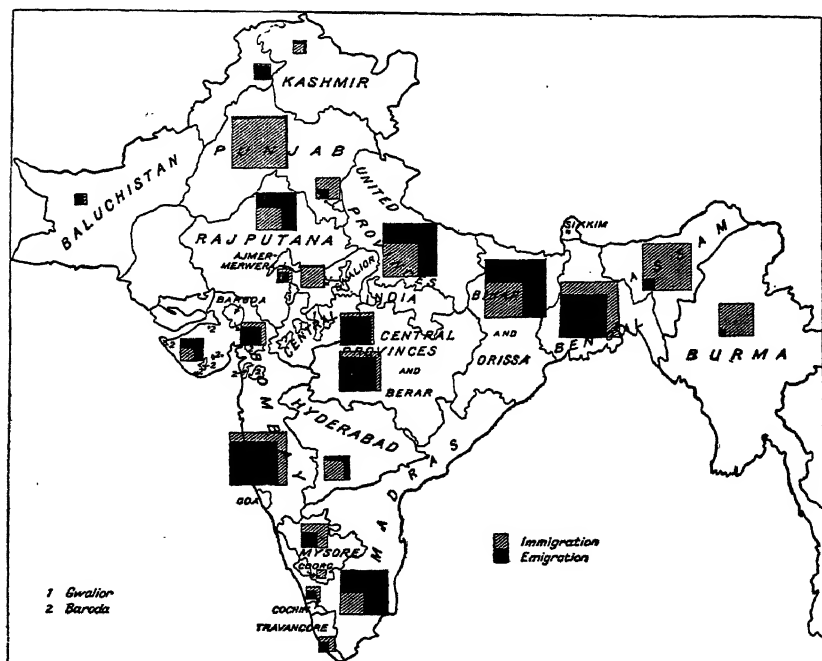


FIG. 102C.—Map showing inter-provincial migration in India.

survive. After the Dravidians, India was invaded again and again by waves of people from the north-west, by clever cultured peoples who closely resemble the well-bred European in type and are scarcely darker than the average South European. They are represented to-day by the Rajputs, Jats and others. They took possession of the best lands, such as the fertile plain of Hindustan, and drove the Dravidians into Peninsular India, south of the Satpura line. Pressing on the heels of the Indo-Aryans, but never penetrating far into India, were the Turko-Iranians—the Baluchis, Brahuis and Afghans.

Then India has been influenced from the north-east by purely Mongolian peoples—the present inhabitants of Burma, parts of Assam and Nepal. Eight racial types may be distinguished at the present day <sup>1</sup>:

- (a) Pre-Dravidians—such as the Veddas of Ceylon.
- (b) Dravidians—confined to Southern India.
- (c) Aryo-Dravidians due to a mixture of Indo-Aryans and Dravidians—typical of the United Provinces.
- (d) Indo-Aryans or Indo-Europeans—the ‘aristocracy’ of the invaders who remained pure.
- (e) Scytho-Dravidians—a Turko-Iranian-Dravidian mixture e.g. many Marathis.
- (f) Turko-Iranians of the north-west borders.
- (g) Mongoloids such as Nepali, Burmans, etc.
- (h) Bengalis or Mongolo-Dravidians where Aryan blood has mixed in the upper strata of a Mongoloid-Dravidian fusion.

**Language.** The racial divisions just mentioned are not recognized in India; they do not exactly correspond to any established division of the people and are determined mainly on anthropometric grounds. A clear-cut division of the country on the basis of language is possible, but it must be remembered that certain languages have become widespread and are spoken by people of varied race, origin and religion, whilst some of the indigenous and most interesting languages are almost extinct. We may distinguish four main groups of languages:

- (a) *The Austric family* includes Malay in one group and the Talaing language of Lower Burma in others. It is interesting as including also the Munda languages spoken by the hill tribes (Santali, Kherwari, etc.) in the Chota Nagpur Plateau and elsewhere in India. They are simple agglutinative languages and probably represent the speech of the earliest inhabitants of India.
- (b) *The Dravidian family* of languages is mainly confined to the south of India. Those who hold that the Dravidians are the aboriginal inhabitants of India regard the Dravidian tongues as descended from the language of its original people. The Dravidian languages include Telugu, Tamil, Kanarese and Malayalam, and are spoken by over 60,000,000 people. The whole family of languages is restricted to India.

<sup>1</sup> This scheme is far from being universally accepted as expressing the racial origins of India, especially as regards the Marathis and Bengalis.

- (c) *The Tibeto-Chinese family* of languages includes those spoken by the Mongoloid inhabitants of Burma (Burmese) and India's northern borders.
- (d) *The Indo-European family* of languages includes those spoken by the vast majority of Indians, except in the south. The Iranian languages (Balochi and Pashto), shown separately on Fig. 103, form one branch of the family, the other branch (Indo-Aryan) including all the remainder shown on the map except Kashmiri.
- Two other families, the Karen and Mon, are represented among the hill tribes of Burma.

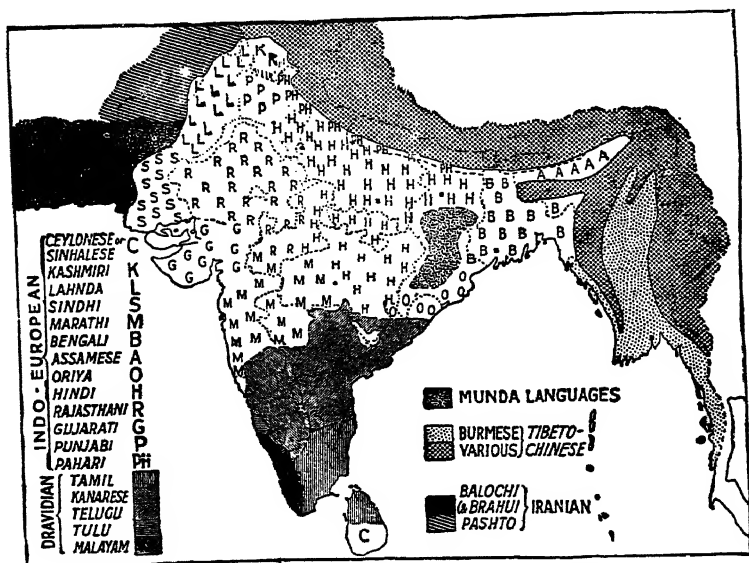


FIG. 103.—The distribution of languages in India.

Those listed under the heading 'Indo-European' all belong to the Indo-Aryan branch of that family (except Kashmiri), whilst the Iranian languages form another branch of the same family.

It must, of course, be realized that the languages of India are no mere dialects but are entirely distinct languages. English was conferred on educated India the boon of a common tongue, and the use of this lingua franca has played an important part in the unification of India. English is an official language throughout India; in each of the provinces one vernacular language or more is also recognized as an official language. In Burma, for example, all Government officers above the lowest ranks must be bilingual, speaking and reading both Burmese and English. Curiously enough, English is but little used

amongst the uneducated masses, although a very large percentage of them is bilingual. All over Northern India and Burma Hindustani (an impure form of Hindi) has been adopted as a common language and is spoken or understood in nearly all the bazaars. Tamil takes its place in Southern India and Ceylon.

**Religion.** More important than race or even language there is religion. In India the lives of the people are often entirely controlled by the dictates of their religion. It determines their upbringing, education, customs and habits, diet, occupations, dwelling-place, type of home and in fact their whole social environment. Hence we may refer to religions also as cultures.

According to the Census of 1931 the numbers professing the various religions are given as follows:

(a) Hindus	..	..	239,200,000	..	67.76 per cent.
(b) Sikhs	..	..	4,340,000	..	1.23 " "
(c) Jains	..	..	1,250,000	..	0.35 " "
(d) Buddhists	..	..	12,790,000	..	3.62 " "
(e) Parsis	..	..	109,000	..	0.03 " "
(f) Mahommedans	..	..	77,680,000	..	22.00 " "
(g) Christians	..	..	6,300,000	..	1.78 " "
(h) Animists	..	..	8,800,000	..	2.21 " "

*Hinduism* may be described as the national religion of India. It is difficult to define Hinduism, and a prominent Hindu, asked for a definition, could only reply that a Hindu is (1) one born in India of Indian parents and (2) accepts and obeys the rule of caste. It has been truly said that language divides the people of India into geographical groups; religion divides them into horizontal strata. A caste may be described as a very rigidly delineated stratum of society. 'Roughly a caste is a group of human beings who may not intermarry, or (usually) eat, with members of any other caste. Very frequently a caste has allotted to it a profession or occupation.' A plausible origin for what is now almost a unique system was propounded in the now famous theory of Dr. Hoernle. He supposed that 'a swarm of Aryan-speaking people entered India through the high and difficult passes of Gilgit and Chitral and established themselves in the fertile plains between the Ganges and the Jumna.<sup>1</sup> They followed a route which made it impossible for their women to accompany them. They took to themselves wives from the daughters of dusky Dravidian aborigines. Herby contact with a different, and in their sentiment, inferior

<sup>1</sup> The Hinduism of the aristocratic Rajputs is believed to have arrived earlier.

the caste came into being.' <sup>1</sup> Perhaps the most famous book on all the religious literature of India is the Institutes of Manu. Here we are told that Brahma, the creator of the known universe, from his mouth, arms, thighs and feet respectively he created the four great leading castes, the Brahman or priests, the Kshatriya or warriors and gentlefolk, the Vaiçya or traders, and the Sūdra or servile classes. Other castes were gradually formed by intermarriage. A man might marry a woman of the caste next below his own, but a woman might not marry a man of a lower caste. The most disgraceful union of all was that between a Brahman woman and a Sūdra man, the resulting offspring being relegated to the lowest caste of all, the Chandāl.

Western nations may rant at the present-day development of the caste system, but the underlying ideas are firmly rooted in mankind. How many Americans, to take an example from a thoroughly democratic race, view with equanimity the mating of one of their white womenfolk with a negro? The Jim-crow car suggests the untouchables. Or even to details: the rich young screen hero, scion of a noble family, marries the pretty flower-girl who ain't got no grammar and lives happily ever after. But even the most venturesome scenario writer rarely makes a successful match of the noble lady and the dago dustman.

The present multitude of castes in India has been classified in a variety of ways. Occupational or functional castes are hereditary trade unions with strict rules; tribal castes have arisen by the conversion of border tribes; sectarian castes are of the religious revival order; castes have also been formed by migration, changes of custom as well as by intermarriage, as already explained.

Hinduism, as a religion, recognizes a Supreme Being and a host of minor deities. Superimposed on a heterogeneous people differing widely from one another in race, language and political and social traditions and interests, the vagueness and elasticity of its system and the protean form of its mythology, its ceremonies and its ordinances, have enabled it to absorb and overlap the various animistic systems which it encountered. But its very adaptability goes far to deprive it of synthesis and cohesion and the inherently disruptive tendency of its caste system, unrestrained by any paramount central authority, places it largely at the mercy of local and sectional interests.' <sup>2</sup>

<sup>1</sup> J. D. Anderson, *The Peoples of India* (Cambridge, 1913).

<sup>2</sup> An educated Brahman once told the writer that he could see no difference between his religion, which recognized one Supreme Being as Creator of the Universe and which taught a moral and ethical code

Very great importance attaches to certain of the custom associated with Hinduism. One is the custom of pilgrimage to sacred spots—particularly to Hardwar or Benares on the Ganges. These movements have been responsible for the spread of culture, language, trade, and have done much to bring about the contact between races which is so important a factor in economic and social progress. Another is the custom of infant or child marriage. Eleven per cent. of Hindu girls under 10 are already married, 44 per cent. are married by the age of 15 and 81 per cent. by the age of 20. Eugenically, the traged

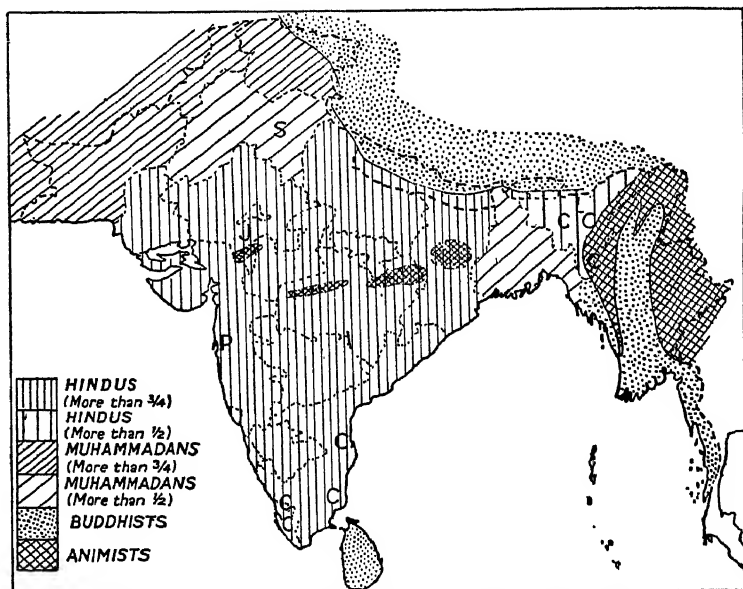


FIG. 104.—The distribution of religions in India.

is not in child marriage, but in the effective cohabitation which commences usually at the first signs of puberty. The effect of infant and maternal mortality is obvious. Further, the prejudice against the re-marriage of widows is deep-seated in Hindu social opinion, with the result that many women are condemned in infancy to lifelong widowhood. Despite efforts for reform by individuals and governments, there is little sign of change

by sanctifying or deifying (for the benefit of ignorant masses) great teachers or leaders, and the Unitarian form of Christianity. Further, I saw no reason why Christianity should not be absorbed as a sect of Hinduism, a sect whose followers were devotees of and believers in the deity of Jesus Christ. A remarkable book of recent years is Jones' *The Christ of the Indian Road*, which deserves study in this connection.

the customs of the masses. According to the Census Report 1921 :

- (1) Marriage is almost universal in India both for men and women.
- (2) Infant and child marriage is still prevalent ; only in the most advanced classes is there any tendency for the age of marriage after puberty to increase.
- (3) The proportion of widows has increased, possibly partly owing to the increasing orthodoxy of the lower castes and tribes.

*Sikhs.* Sikhism was an attempt to reconcile the ancient hindu beliefs with a purer creed, which rejected polytheism, image worship and pilgrimages. It remained a pacific cult till the political tyranny of the Mahommedans and the social tyranny of the Hindus converted it into a military creed. Two of the fundamental rules required of a Sikh are that he should wear long hair and refrain from smoking. The Sikhs include over 3,000,000 of the fine stalwart people of the Punjab and the north-west.

*Jains.* The Jain religion is held to have been an offshoot from Hinduism and many Jains still consider themselves Hindus. They are traders and widely distributed in India.

*Buddhists.* Buddhism arose as an offshoot of Hinduism, and Gautama Buddha, founder of this atheistic, highly moral religion, reached in the Ganges Valley. Buddhism is now, however, practically extinct in India proper, but is the national religion of Burma.

*Parsis.* The Parsis, or Zoroastrians, are Sun-worshippers and follow the ancient creed of Persia. The Parsis are a well-to-do community, almost entirely restricted to Bombay city. Their custom of delivering up their dead to the fowls of the air is one which has always attracted attention—perhaps far less nauseating than appears at first sight.

*Mahommedans.* Mahommedanism, or Islam, is the second great religion of India. Brought by invaders from the north-west, its stronghold is still in the north-west of India, but it has penetrated right down the Ganges Valley and is firmly established in Bengal. Islam has never, however, penetrated to the same extent in Peninsular India, and in most of Southern India the Mahommedans do not number more than 10, or possibly 15, per cent. of the population. Islam in India has been strongly affected by Hinduism : many Mahommedans—specially converts from Hinduism—retain caste and observe hindu festivals as well as their own. Nevertheless there is a great gulf between Hindus and Mahommedans ; the deep-rooted antagonism between them is ever ready to flare up.

Purdah is still rigidly observed among the majority of Muslim women, and this custom has been the controlling influence in domestic architecture. It may be noted that purdah is also observed by high-caste Hindus.

*Christians.* Christianity now claims 6,297,000 (1931) of the people of India—an increase of 33 per cent. in the decade 1921-31. The Syrian Christians, who from the early centuries of the Christian era have formed the bulk of the population of Travancore, form a group quite distinct from the proselytes of the Christian missions in India. The Roman Catholics (1,823,000), Anglican (533,000) and Baptist (444,000) are the most numerous sects (1921). Christianity has made great progress among the Animistic hill tribes and the lower-caste Hindus. Increase 1881-1931, 238 per cent.

*Animists.* Under the comprehensive title of Animism are grouped the primitive faiths of the hill peoples, usually involving some form of spirit worship.

The great religions of India tend to be associated with definite 'religious centres'—famous places of pilgrimage or seats of learning connected with one of the religions. Thus Benares, with its thousands of Hindu temples and its Hindu colleges, is a centre of both the Hindu religion and the culture connected with it. The influence of such a cultural centre spreads through all grades of society: the establishment within recent years of the great Benares Hindu University bears witness to the vitality of the influence of Benares amongst the educated, just as the countless crowds who throng to its bathing ghats do to its influence amongst the masses. To the Hindus the Ganges is the most sacred river: to die or to be cremated on its banks is to gain everlasting peace. Hardwar, where the Ganges leaves the mountains, and Allahabad, where the Ganges and Jumna join, are especially sacred. Lahore is a great centre of Mahommedanism, whilst the Sikhs, Jains and Parsis are grouped about their cultural centres in the Punjab, Rajputana and Bombay respectively. Rangoon and Mandalay in Burma and Kandy in Ceylon are centres of Buddhism; Budh Gaya where the Buddha received his enlightenment, is a place of pilgrimage in Bihar.

Religion controls the food requirements of the Indian population. The Hindus are for the most part vegetarians; the Mahommedans eschew alcohol and pork, regarding the pig as an unclean animal. It is forbidden for a Buddhist to take life and he will not kill an animal for food.<sup>1</sup> To a less extent

<sup>1</sup> It should be observed that in fishing one does not take life; out of the water the fish dies. Meat which someone else has killed is permissible food to most Buddhists.



religion controls clothing, though it is impossible here to detail the numerous types of costume found in India.

**Occupations.** India is mainly an agricultural country and agriculture supports no less than 73 per cent. of the population (agriculture proper, 71 per cent.; pastoral and hunting occupations, 2 per cent.). The other occupational classes are shown in the table (1921 Census, whole of India; 1931 calculated):

	Total, 1921. Per cent.	Total, 1931. Per cent.
I Pasture, Agriculture and Hunting	72.98	67.0
II Mines and Minerals . . . . .	0.17	0.1
III Industry . . . . .	10.49	9.7
IV Transport . . . . .	1.37	1.5
V Trade . . . . .	5.73	5.4
VI Police Force . . . . .	0.69	0.5
VII Public Administration . . . . .	0.84	0.8
VIII Professions and Arts . . . . .	1.59	1.7
IX Independent . . . . .	0.15	13.3
X Domestic Service . . . . .	1.44	
XI Unclassified . . . . .	3.51	
XII Unproductive . . . . .	1.04	

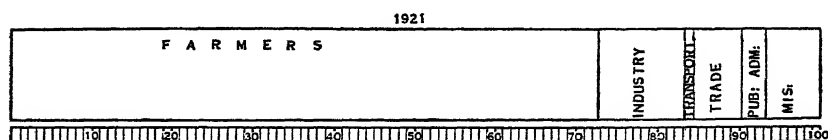


FIG. 105.—The occupations of the people of India.

**Manufacturing in India.<sup>1</sup>** Great changes have taken place in recent years in the status of India as a manufacturing country. Factory industries have not only been established to supply the needs of the huge local market, but there are indications in many cases that supply will exceed the home demand and that India's manufactured goods will seek an entry into the world's markets—especially in the Far East and in competition with Japan.

Although the development of power industries has profoundly affected Indian life in many of the larger towns, village industries and handicrafts are still important. It is true that the old craftsmen are dying out and that the influx of workers to the mills scarcely balances, in numbers, the loss of workers in the old native industries. In the decade 1911-21, for example, there

<sup>1</sup> On all that concerns the economic position of India reference should be made to that invaluable volume by Dr. V. Anstey, *The Economic Development of India* (Longmans, 1930).

was a decrease of 6 per cent. in the numbers employed in industry. Amongst the handicrafts which still exist, most villages have their weaver, dyer, potter, carpenter and blacksmith. In certain centres are more specialized handicrafts—wood and ivory carving, the working of brass, silver and gold, the making of rugs and carpets, the weaving of silk and hand-printing of cotton cloths and the making of lacquer goods. The skill of the workers is such as to excite the admiration of western nations and create a limited 'luxury' market for the goods. In sum the output of these traditional but unorganized crafts must be very large.

Power industries are mainly the product of the present century. Although the first jute-mill near Calcutta dates from 1858 and the first cotton-mill near Bombay from 1851, the extension beyond these two towns and these two industries was slow. Labour had to be trained—as well as to be brought from rural environments—and coal had to be imported and the products of the mills had to overcome the competition of goods from Britain and other countries with a long tradition of factory work. 'Cheap' labour is not cheap unless it is also efficient, and efficiency involves training and practice. But recent progress has been phenomenal. In 1893 there were only 700 factories coming under the Factory Acts; in 1929 there were 7,000.

*Iron and Steel.* The smelting of iron is a very old village industry and traces of old workings can be found in very many areas. But the native industry was almost killed by cheap imported iron before a modern large-scale industry was established under a system of protection. India owes its modern industry to the courage and determination of a Bombay merchant—Mr. Jamsetji Tata. Under his sons the Tata Iron and Steel Company was formed and the first blast furnaces were started in 1911. The Company's output of pig-iron reached 842,000 tons and of crude steel 721,000 tons in 1933-34 (record figures to that date). This represents three-quarters of India's consumption of rails, sections, bars, plates, etc. The focus of the industry is the Eastern Bengal-Bihar Coalfield region. Jamshedpur (near the Singhbhum iron-field) has been changed from a village to an industrial town of over 100,000 inhabitants within the space of a few years. Other companies include the Bengal Iron Company and the Indian Iron Company, and there are smelting works on the coalfields at Asansol, Kulti and Jherria. The Tata Company had a monopoly of steel production until 1934-35, when works (using scrap and Tata iron) were erected at Belur on the Hooghly River, north of Calcutta.

*The Cotton Industry.* Cotton is one of the native plants of India, and although enormous quantities are produced for export more than half the raw cotton produced is used in the country. Taking the first thirty years of the present century, the consumption of piece goods has increased 35 per cent. per head of population—consequent upon the rising standard of living—and the total consumption by nearly double that percentage. To

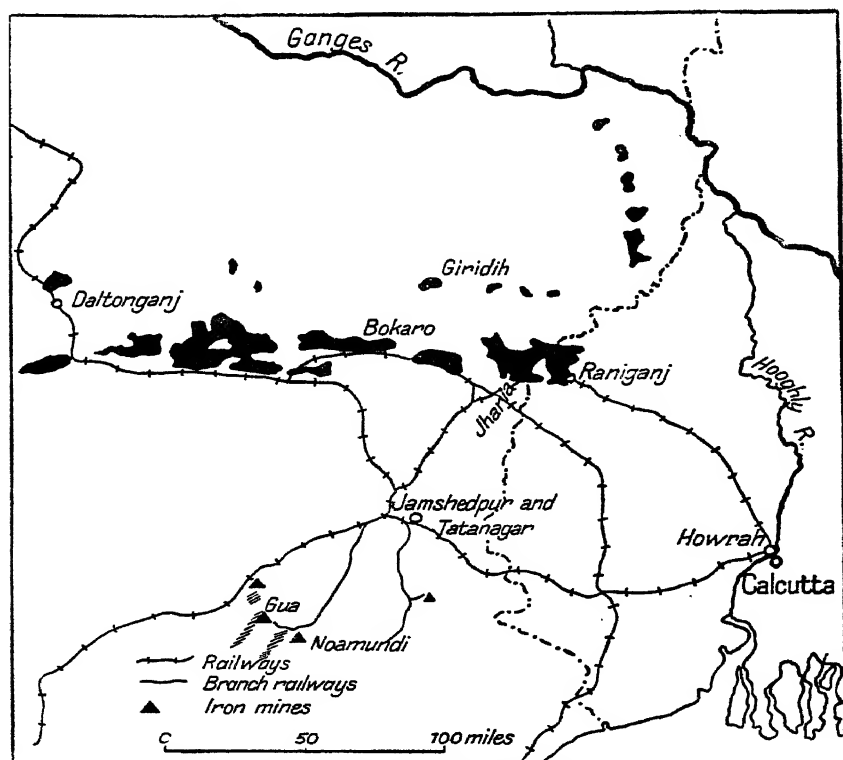


FIG. 105A.—Map showing the position of Jamshedpur.

meet these new demands the village industry as well as the factory industry has increased its output—the village industry from 850 to 1,300 million yards; the mill industry from under 100 to about 2,500 million yards. In the same period imports have dropped by 300 million yards. The modern mill industry includes over 300 spinning and weaving factories (apart from 1,000 ginning factories), and with 10,000,000 spindles and nearly 100,000 looms employs 400,000 people, apart from 130,000 in the spinning or oil-pressing factories. Unlike the jute industry, which

was founded by Europeans with European capital, the cotton-mills are almost entirely Indian owned and financed. The most important centre is Bombay, where a quarter of a million are employed; others are Ahmadnagar, Nagpur and Jubbulpore in the Central Provinces and several places in Madras Presidency. Both Bombay and Karachi export raw cotton, but the aridity of the climate is responsible in some measure for the absence of mills in Karachi and the Punjab. Bombay enjoys the advantages of hydro-electric power.

*The Jute Industry.* Raw jute and jute manufactures account for more than a fifth of the exports of India, but the manufactures are worth twice the raw material. Of the world's production of 2,000,000 tons practically all is from Bengal and the mills are along the Hooghly, north of Calcutta. Jute has been described as the 'brown paper of the wholesale trade', and the industry has suffered recently from (a) the depression in world trade; (b) the use of local substitutes such as cotton waste, sisal fabrics, etc., as well as of paper bags for cement, etc.; and (c) the increase in bulk handling of such commodities as grain. In eight years, from 1925-26 to 1933-34, the market value of jute dropped to one-quarter—the total value of exports from £72,000,000 to £24,000,000. The hundred mills in India employ over a quarter of a million people, the hundred presses another 30,000, whilst cultivation must afford an occupation for a million people at least.

*The Silk Industry.* India has long been famous for its beautiful silks and many of the old towns are still noted for special types. But there are only nine modern mills and much of the raw silk is imported from China. Brocaded silks are made in Bengal, the Punjab and southern India; striped silks and the famous gold brocades all over northern India at such centres as Agra, Benares, Amritsar, Ahmedabad and Surat. Burmese silk, made near Mandalay, is a fine special type.

*The Woollen Industry.* India has long been celebrated for carpets and shawls. The weaving of shawls is a typical industry of Kashmir. Carpet making is carried on in many parts of India but especially in the Punjab, Kashmir and in the Central Provinces, various towns producing distinctive types. Coarse blankets are made in many parts of northern India, where the winters are cold. It is notable that in all the textile industries cheap imported dyes have almost completely replaced the old vegetable dyes.

*Metal Working.* Many castes in India use brass for all cooking utensils and brass working is an important industry in many towns of northern India—as Benares. Bombay and Poona are centres of silver working, Jaipur and Delhi of gold.

*Other Manufactures.* There are numerous rice-mills in Burma (especially near Rangoon and Bassein); wheat-flour-mills in the Punjab; saw-mills in Assam and Burma (especially near Rangoon); oil refineries in Burma (Rangoon), the Punjab (Rawal-ndi) and Assam; tobacco factories in Madras, Burma, etc.; packing establishments in Assam and Madras; lac factories; as well as general engineering, railway, motor and electrical engineering and shipbuilding works. The manufacture of sugar is spreading rapidly. In 1934 there were 130 sugar factories compared with 30 in 1931; most of them are in the United Provinces and Bihar, and India is trying to obviate the necessity of importing sugar from Java.

**The Communications of India.** By far the most important means of communication in modern India is the railway. In March 31st, 1931, India had over 42,000 miles of line open. There are two principal gauges:

- (a) The broad gauge, 5 feet 6 inches, including most of the main lines and in all half the railways of India.
- (b) The metre gauge, 3 feet 3½ inches, used mainly for branch lines, but the only gauge used in Burma and the prevalent gauge north of the Ganges River.

There are over 4,000 miles of local and hill railways on special gauges of 2 feet 6 inches and 2 feet. 31,000 miles of Indian railways are State-owned, in addition to 6,000 miles owned by Indian States. The railways are usually worked, however, by private companies.

Most of the important railways of India run from the four chief ports (Calcutta, Bombay, Karachi and Madras) to different parts of their hinterlands.

From *Calcutta* four main lines radiate:

- (a) The Eastern Bengal Railway (E.B.R.) runs to the north to Darjeeling and to the north-east into Assam. At Sara there is a bridge across the Ganges, but the lines are still broad gauge south of the river and narrow gauge to the north. In other places the railway is interrupted by the Ganges or Brahmaputra. In connection with the railways to the north-east of Calcutta the Assam-Bengal Railway from Upper Assam to the port of Chittagong should be noticed.
- (b) The East Indian Railway (E.I.R.) runs from Howrah to the great coal-fields, across the corner of the Chota Nagpur Plateau to the Ganges Valley. There is a bridge over the Ganges at Benares (the first above Sara), but the main line to Allahabad, Cawnpore, Delhi and Ambala remains to the south of the river.

(c) The Bengal Nagpur Railway (B.N.R.) runs from Howrah right across the plateau to Nagpur, where it joins the G.I.P.R. to Bombay.

(d) The Bengal Nagpur Railway has another main line from Howrah to Vizagapatam along the East Coast.

In the Ganges Valley there is a network of metre-gauge lines north of the river (Bengal and North Western Rail-



FIG. 106.—The principal railways of India, showing the way in which the main lines radiate from the four great ports.

way, etc.), but most of the lines south of the river are broad gauge.

From *Bombay* there are also four main lines:

(a) The Bombay, Baroda and Central India Railway (B.B. & C.I.R.) runs north to Baroda and Ahmadabad (where the gauge changes from broad to metre) and thence to Delhi. There is a continuous line via Agra on the broad gauge.

- (b) The Great Indian Peninsular Railway goes north-east to Jubbulpore, where it connects with the E.I.R. and runs on to Allahabad. This is the route followed by the mail-trains between Bombay and Calcutta.
- (c) The G.I.P.R. has another main line eastwards through the cotton districts to Nagpur.
- (d) The G.I.P.R. has again a main line south-eastwards via Poona to Raichur, where it connects with the M. & S.M.R. to Madras.

It should be noted that no line runs along the west coast south of Bombay.

*Karachi* really has only one railway, the North Western Railway, which runs to Hyderabad. From Hyderabad there are two main lines—one to Delhi across the southern end of the Thar Desert, the other up the Indus Valley to the Punjab. The N.W.R. also has a network of lines in the Punjab and a branch through Baluchistan.

From *Madras* again four lines radiate :

- (a) The Madras and Southern Mahratta Railway runs northwards to Vizagapatam and joins the B.N.R. to Calcutta.
- (b) The M. & S.M.R. also runs north-westwards to Raichur and then links with the G.I.P.R. to Bombay. There is a branch to the Portuguese territory of Goa.
- (c) The South Indian Railway runs westwards, through the Palghat Gap, to the west coast at Mangalore and Cochin. Thus the west coast at present lies in the hinterland of Madras.
- (d) The S.I.R. (metre-gauge main line) runs southwards to Dhanushkodi (the mail port for Ceylon) and also to Tuticorin and Trivandrum.

There are also, of course, very large numbers of branch lines in all the more thickly populated parts of India. Reference will be made later to the important new line from Vizagapatam to Nagpur. It must be emphasized that the railways of India are entirely cut off from the surrounding countries. The Baluchistan line runs a few miles into Persian territory; the Khyber Pass line runs to the Afghan Border, but there is not even a railway connecting India and Burma.

When compared with other civilized countries India has very few metalled *roads*. There are a few 'trunk roads', such as the one from Calcutta to Peshawar; others are being built for the increasing motor traffic, but even the trunk roads are

often badly in need of repair. A large proportion of the metalled roads of India are found round the larger towns, or acting as 'feeders' to the railways. There is little actual pleasure in road travel in India. A Ford can go almost anywhere in the dry season, but there is little romance in being flung about for hour after hour while a 'tin Lizzie' is being urged by a nerveless driver to jump from boulder to boulder. Away from the railway one is often restricted to the maximum of 15 or 20 miles a day which bullock-cart travel will allow.

The *rivers* of India are much less important than formerly,

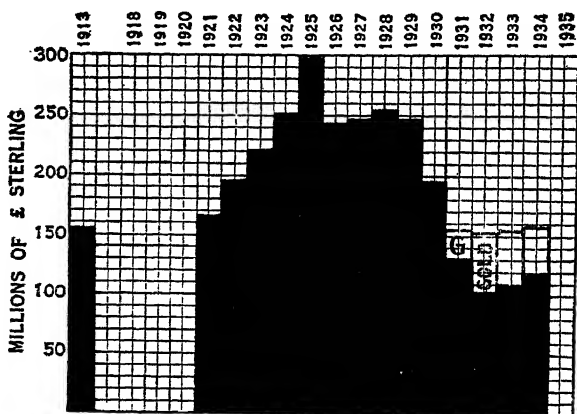


FIG. 107.—Graph showing the fluctuations in the value of the exports of India, expressed in sterling, converted at the rate of exchange averaged for each year.

as already explained, owing to the growth of the railways and the use of river water for irrigation. The largest system of river transport is found on the Irrawaddy in Burma and on the Ganges and its connections east of Patna. Except for the Calcutta and Eastern Canals, the salt-water Buckingham Canal of Madras and the canals of the Southern West Coast, the canals of India are little used for navigation—they are for irrigation.

**The Foreign Trade of India** (including Burma).<sup>1</sup> The great bulk of the foreign trade of India is sea-borne—only about 6 per cent. of the total foreign trade is overland. Further, nearly all the sea-borne trade, especially the export trade,

<sup>1</sup> The writer apologizes for this cursory glimpse of India's trade, which is all that space will allow. Reference should be made to Anstey's *Trade of the Indian Ocean* (Longmans, 1929).



passes through the five great ports—Bombay, Calcutta, Karachi, Rangoon and Madras.

## TOTAL TRADE OF EIGHT PRINCIPAL PORTS.

In crores of rupees.

Port.	Pre-War Average.	War Average.	1923-28.	1930-31.	1932-33. <sup>1</sup>
Bombay . . .	145	158	240	161	142
Calcutta . . .	160	162	250	158	89
Rangoon . . .	49	52	93	75	28
Karachi . . .	48	47	95	53	29
Madras . . .	20	21	42	37	25
Cochin . . .	6	6	10	10	4
Tuticorin . . .	7	8	12	9	5
Chittagong . . .	7	7	14	11	4

These figures include all foreign and coasting trade, except Government stores, in merchandise. The coasting trade is about one-quarter of the whole. These eight ports have about 95 per cent. of the total sea-borne trade. The enormous import of treasure, to which reference is made later, is almost entirely through Bombay and is additional to the above figures.

*Exports of India.* Fig. 107 shows the value of the exports of India in the last few years. The apparent rise and fall in the trade 1921-27 is largely due to exchange variations. The rupee is now standardized at 1s. 6d. The export trade, expressed in crores of rupees, has been as follows (figures for calendar years and *not* the Indian financial year):

1913 . . . . .	254 crores.	1928 . . . . .	337 crores.
1921 . . . . .	265 "	1929 . . . . .	328 "
1922 . . . . .	299 "	1930 . . . . .	223 "
1923 . . . . .	346 "	1931 . . . . .	209 "
1924 . . . . .	389 "	1932 . . . . .	215 "
1925 . . . . .	410 "	1933 . . . . .	199 "
1926 . . . . .	323 "	1934 . . . . .	215 "
1927 . . . . .	318.5 "	1935 (est.) . . .	205 "

The exports include gold and silver valued at 77 crores in 1932 and 52 crores in 1933.

Although India has thus a large export trade—the exports rose to nearly £300,000,000 in 1925—the trade is small when compared with the vast population of 353,000,000 and less than £1 per head. The principal items of export are shown in

<sup>1</sup> Foreign trade only.

Fig. 108. It will be seen that raw materials and food represent three-quarters of the whole. The items shown there are localized

1921-25									
RAW MATERIALS AND FOODS					MANUFACTURES				
RAW COTTON	RICE	OIL-SEEDS	TEA	RAW JUTE	VARIOUS	JUTE MANS.	COTTON MANS.	HIDES & LEATHER	
10	20	30	40	50	60	70	80	90	100
1927-8 TO 1931-2									
RAW MATERIALS AND FOODS					MANUFACTURES				
RAW COTTON	RICE	TEA	OIL-SEEDS	RAW JUTE	VARIOUS	JUTE MANS.	COTTON MANS.	HIDES AND LEATHER	VARIOUS

FIG. 108.—The exports of India, expressed as percentages of the total value.

JUTE			
MANUFACTURED	RAW	TEA	OTHERS (1)

CALCUTTA (2)

(1) Including rice, iron and steel, lac, oil suds, coal, hides and skins, wool (and hair), oil cake.

(2) This is for private trade only.

COTTON		OIL-SEEDS	
RAW	MAN.	GROUNDNUTS	OTHERS (1)

BOMBAY (2)

(1) Including wool, hides and skins, grain, oils and oil cakes.

RICE		ORES	PAR.	COTTON	OTHERS
	LEAD		WAX	TEAK	

RANGOON

RAW COTTON		OIL-SEEDS	WOOL	OTHERS (1)
------------	--	-----------	------	------------

KARACHI

(1) Including barley and wheat.

LEATHER		GROUNDNUTS	COTTON	OTHERS (1)
		GOODS		

MADRAS

(1) Including tobacco and raw cotton.

FIG. 109.—The exports of the principal ports of India, shown comparatively.

in their origin. Thus all the jute and nearly all the tea are exported from Calcutta; the bulk of the raw cotton and cotton goods from Bombay; nearly all the wheat and barley and some raw cotton from Karachi; nearly all the Rice from Rangoon.

These differences are shown diagrammatically and roughly to scale in Fig. 109, whilst in Fig. 110 an attempt is made to show the hinterlands of the great ports.

*Imports of India.* Fig. 111 shows the value of the imports of India in the last few years. Again the apparent movements are deceptive, and the value (including gold and silver which

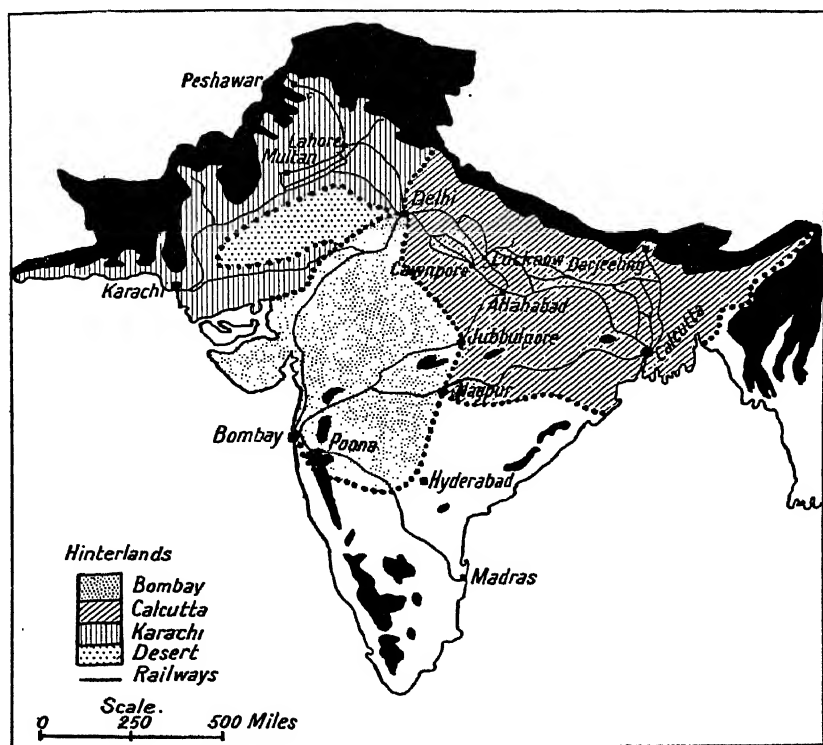


FIG. 110.—The approximate hinterlands of the three leading ports of India.  
Land over 2,500 feet, black.

until the recent rise in the value of gold relative to the silver rupee represented about 21 per cent. of the whole) expressed in rupees is as follows :

1913 . . . . .	238 crores.	1928 . . . . .	253 crores.
1921 . . . . .	320 "	1929 . . . . .	248 "
1922 . . . . .	305 "	1930 . . . . .	185 "
1923 . . . . .	299 "	1931 . . . . .	137 "
1924 . . . . .	318 "	1932 . . . . .	126 "
1925 . . . . .	319 "	1933 . . . . .	118 "
1926 . . . . .	289 "	1934 . . . . .	129 "
1927 . . . . .	308 "	1935 (est.) . . .	135 "

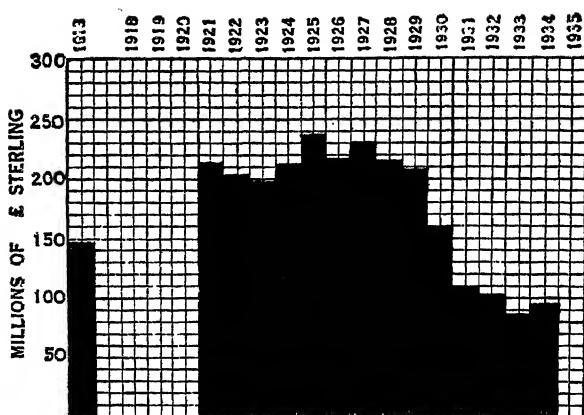


FIG. 111.—Graph showing the fluctuations in the value of the imports of India expressed in sterling, converted at the rate of exchange averaged for each year.

Taking a pre-depression year (1927) the export trade and the import trade is equivalent to rather under 10 rupees—about 15 shillings (in each case) per head of population. Fig. 112.

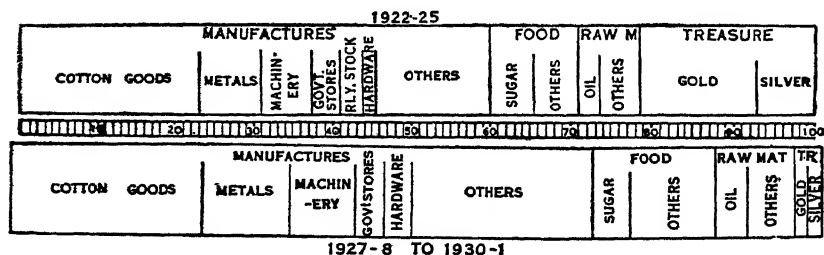


FIG. 112.—The imports of India.

shows the principal items imported. Special attention must be directed to the huge proportion of gold and silver. The poorer classes in India have not yet learnt to appreciate and use savings banks, and what wealth they have is in the form of gold and silver ornaments—such capital as the masses possess lies idle. Much of the gold is from the Transvaal. This position was completely changed from 1931 onwards, when India commenced to export huge quantities of this hoarded treasure. In a hot country such as India all the absolutely necessary clothing can consist of cotton garments, hence the large import of cotton manu-

factures—mainly from England and Japan. Except for the treasure import, which is virtually restricted to Bombay, there is a general sameness in the import trade of all the ports. It should be noted that the trade of the smaller ports is an export trade rather than an import. It pays a tramp or a liner to visit a small port to pick up a good cargo—e.g. after the paddy harvest a Bibby liner visits Bassein for a cargo of rice—but it does not pay them to visit the same ports to unload a small quantity of miscellaneous cargo.

*The Direction of Foreign Trade.* This has been shown diagrammatically in Fig. 113. It serves to illustrate, amongst other things, the importance of India as a market for the manufactures of the United Kingdom. The bulk of the foreign trade is carried in British bottoms.

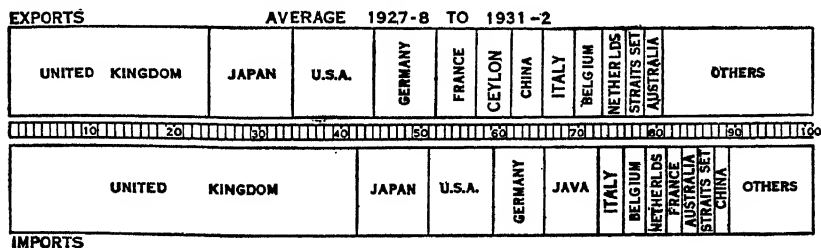


FIG. 113.—The direction of the foreign trade of India.

The value of the import and export trade with each country is expressed as a percentage of the total value of the import and export trade respectively (merchandise only) for the average of the years 1927-32. When a comparison is made with pre-War years it is found that important changes are taking place. In 1909-14, 25 per cent. of the exports went to the United Kingdom, 17 per cent. to the rest of the British Empire, but only 7 per cent. to Japan and 7 per cent. to the United States. In the same years the United Kingdom supplied 63 per cent. of the imports, the rest of the British Empire 7 per cent., but Japan only 2 per cent. and the United States 3 per cent. See V. Anstey's *Trade of the Indian Ocean*, 1929, pp. 73-79, and the annual *Summary of Trade of British India*.

#### NUMBER AND NATIONALITY OF SHIPS ENTERING PORTS IN BRITISH INDIA, 1931-32.

Nationality.	Number.	Tons.	Percentage Share in Tonnage.
British . . . . .	1,859	5,593,000	66.8
British Indian . . . . .	186	80,000	1.0
Native . . . . .	674	54,000	0.6
Japanese . . . . .	172	599,000	7.2
German . . . . .	127	553,000	6.6
Italian . . . . .	125	524,000	6.3
Dutch . . . . .	80	271,000	3.2
Norwegian . . . . .	110	242,000	2.9
American . . . . .	47	198,000	2.4
French . . . . .	27	136,000	1.6

*The Foreign Overland Trade.* It has already been explained that this trade is but small. The main lines are shown in Figure 114 and are as follows :

- (a) Persia through Baluchistan. This trade has increased considerably since the construction of the railway.
- (b) Afghanistan, mainly through the Khyber Pass. There has been a sharp rise in this trade recently.
- (c) Tibet and Central Asia through Kashmir.
- (d) Nepal.
- (e) Tibet, especially through Darjeeling.
- (f) China to and from Burma, especially through Bhamo.
- (g) The Shan States to and from Burma.
- (h) Siam to and from Burma.

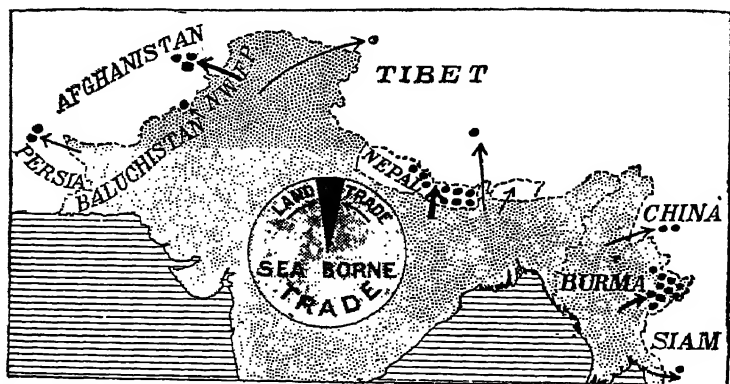


FIG. 114.—The overland foreign trade of India, showing its slight importance when compared with the sea-borne trade.

Each dot represents trade to the value of one crore (10,000,000) of rupees—roughly £750,000—annually in post-War years. The total, excluding the trade from British Burma into the Shan States, was only Rs. 24 crores in 1924-25.

## THE NATURAL REGIONS AND PROVINCES OF INDIA

Although the division of India into a number of broad natural units presents little difficulty, it is curious that until recently no attempt had been made to draw up and to describe a comprehensive scheme of geographical regions. Climatic or rainfall divisions had been made by the Meteorological Department in India, and most of the provinces had been divided into natural regions for Census purposes. The Census regions often differ somewhat widely from the geographers' concept of a natural region. At a somewhat later date a scheme of broad regions was used by McFarlane in his *Economic Geography*. In 1922-24 the present writer drew up a scheme for use in a series of geographical textbooks written for Indian Schools, a scheme

which he has since used in a number of books.<sup>1</sup> An independent scheme, incorporating some unpublished ideas of W. Arden Wood, has recently been published in outline by J. N. L. Baker.<sup>2</sup> Mr. Baker's scheme was drawn up before he knew of that of the writer, and it is satisfactory to find a remarkably close agreement between the two.<sup>3</sup>

In the pages which follow, the scheme used by the writer

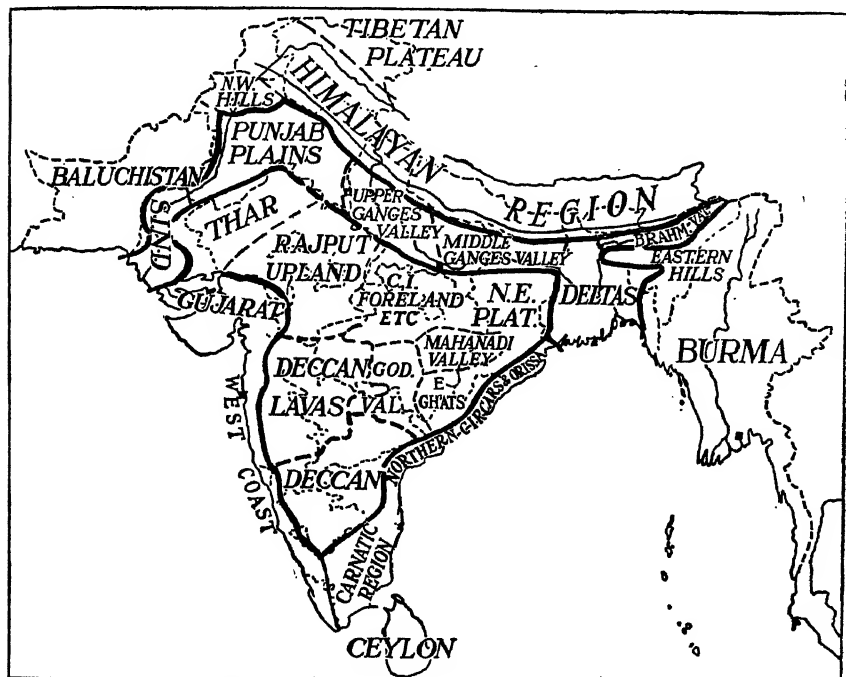


FIG. 115.—The natural regions of India.

Slightly modified from the scheme used in Stamp's *The Indian Empire*. For the correspondence with cultural regions, see F. J. Richards, 'Cultural Regions in India', *Geography*, Vol. XV (1929), p. 20-29.

in the *Regional Geographies of India* will be adhered to, and he is much indebted to Messrs. Longmans, Green & Co., Ltd., for

<sup>1</sup> Stamp and French, *A Geography of Burma for Schools* (Longmans, 1924); Stamp and French, *Regional Geographies of India*: Part I, *North-eastern India* (Longmans, 1925); Part II, *Peninsular India* (Longmans, 1925); Part III, *North-Western India* (Longmans, 1926); Stamp, Part IV, *The Indian Empire* (Longmans, 1926); Stamp, *The World, A General Geography for Indian Schools* (Longmans, 1926); Stamp, *Intermediate Commercial Geography*, Part II (Longmans, 1928).

<sup>2</sup> *Geography*, Vol. XIV (Summer, 1928), pp. 447-455.

<sup>3</sup> *Geography*, Vol. XIV (Autumn, 1928), pp. 502-506.

permission to incorporate a large amount of matter and a number of diagrams from those volumes. By constant reference to the correlation between the natural regions and the Provinces and States of India an attempt has been made to obviate the repetition which would result were the Provinces described separately.

A primary division of India on the basis of physiography and structure has already been made. A further subdivision on a climatic basis is necessary and it is found that the regions determined are, in the main, remarkably homogeneous. The natural regions of India thus fall primarily into three groups:

- (a) The natural regions of the Mountain Wall.
- (b) The natural regions of the Hindustan Plain.
- (c) The natural regions of the Indian Plateau.

Burma and Ceylon are reserved for separate treatment.

**The Natural Regions of the Mountain Wall.** The barrier of mountains by which India is hemmed in on the north, east, north and north-west varies enormously from end to end, especially so far as climatic conditions are concerned. Some localities in Assam can boast rainfalls which rank amongst the highest recorded in the world; some localities in the north-west are almost rainless. Elevation also plays an important part in the differentiation of the mountain wall into distinct regions. The mountain wall of India may therefore be considered as comprising six units:

- (1) The Eastern Hills Region—or the North-East Hills—comprises the eastern parts of India's mountain range, the hills which separate India proper from Burma and the hills which occupy a considerable portion of the province of Assam. Broadly speaking, the region is one of very heavy rainfall and was originally covered with thick evergreen forest of Equatorial type. The population, naturally, is but sparse.
- (2) The Himalayan Region comprises the Himalayan Mountain Chain approximately from the level of 5,000 feet upwards. It is at that level that marked changes in vegetation occur and that the notoriously unhealthy sub-tropical forests give place to the healthy invigorating heights associated in the popular mind with India's famous hill stations.
- (3) The Sub-Himalayan Region comprises the foothills between the plains and the mountains as well as the lower slopes of the Himalayas themselves. Both the Himalayan and Sub-Himalayan Regions fall naturally into a wetter eastern half and a drier western half.
- (4) The Tibetan Plateau lies on the far side of the Himalayas



but a small fragment comes within the borders of India in the State of Kashmir.

- (5) The North-Western Dry Hills or the North-West Frontier Region comprises the north-western portion of the mountain wall. By contrast with the north-east it is a very dry region but agrees with all parts of the mountain wall in being but sparsely populated.
- (6) The Baluchistan Plateau, like the Tibetan Plateau, lies outside the mountain rim and is a dry plateau scarcely affected by the monsoon which plays such a dominant part in India proper.

**The Natural Regions of the Hindustan Plain.** The subdivision of the great alluvial plain of Northern India is again based on climatic variations. True, there is a distinction between the older alluvium of the Punjab and the United Provinces and the younger alluvium of the deltas, but the resulting regional differences are but slight when compared with the regional variations caused by climate.

- (7) The Lower Indus Valley or Sind is the alluvial plain of the Lower Indus, lying in a region of very low and irregular rainfall and depending for its supply of moisture on water from the Indus.
- (8) The Punjab Plains occupy the larger and more important part of the province of the same name and comprise a still more extensive plain in a region of low rainfall—depending very largely for water on the five tributaries of the Indus. This region is sometimes called the Indo-Gangetic Plain west.
- (9) The Upper Ganges Plain comprises that portion of the Gangetic Plain which has an annual rainfall of less than forty inches—corresponding to the western two-thirds of the United Provinces.
- (10) The Middle Ganges Plain may be described as an intermediate region with a mixture of wet zone and dry zone crops. The Upper and Middle Ganges Plain are linked together in Mr. Baker's scheme as the Indo-Gangetic Plain east.
- (11) The Lower Ganges Plain or the Deltas Region is the wet region of newer alluvium corresponding roughly with the province of Bengal.
- (12) The Brahmaputra Valley or Assam Valley is narrow compared with the Ganges Valley. It is, like the Deltas, a region of heavy rainfall.

**The Natural Regions of the Indian Plateau.** The whole of India south of the Hindustan Plain may be called the Indian

Plateau. One might use the term Peninsular India, but more frequently that designation is reserved for the land south of the Satpura Range. At the same time it is unwise to refer to the Deccan without qualification because of the multiplicity of meanings which has been given to that name. Ten natural regions grouped as follows may be distinguished:

(a) Coastal Regions round the plateau proper.

(13) Cutch, Kathiawar and Gujarat, forming the transition between the dry Indus Valley and the Thar Desert on the one hand and the very humid West Coast on the other.

(14) The West Coast Region lies between the crest of the Western Ghats and the Arabian Sea and comprises a narrow coastal plain and the slopes of the Western Ghats. It falls into northern and southern halves lying respectively in Bombay and Madras Presidencies and separated by the Portuguese territory of Goa.<sup>1</sup> The whole region is very wet, but the dry season becomes progressively longer as one goes northwards, away from the almost Equatorial climatic conditions of Travancore.

(15) The Carnatic or Tamil Region, also referred to as the East Coast south, comprises a broad coastal plain and an inland hilly part. The region differs from the remainder of India in the incidence of the rainfall; October, November and December being the rainiest months.

(16) The Northern Circars Region, including Orissa, also referred to as the East Coast north, lies between the Eastern Ghats and the Bay of Bengal.

(b) Regions of the Plateau (Peninsular India proper).

(17) The Deccan Region, using the word Deccan in the strict sense, is the high southern portion of the plateau.

(18) The Deccan Lavas Region is the north-western part of the plateau, lying mainly in Bombay Presidency, with a dry climate and the sticky black cotton soil.

(19) The north-eastern part of the plateau is a complex region comprising five subdivisions—the Central Indian Highlands, Chota Nagpur Plateau, Eastern Ghats, Chhattisgarh Plain or Mahanadi Valley

<sup>1</sup> The Bombay Presidency district of North Kanara lies south of Goa in the southern division of the West Coast.

and the Godavari Valley. The region as a whole has a moderate rainfall (40 to 60 inches) and is thinly populated and still largely covered with forest. The population is concentrated mainly in the two valley regions.

- (c) Regions north of the Satpura mountain line and sloping down towards the Hindustan Plain. The mountain belt itself is often treated as a distinct region.
- (20) The Central Indian Foreland lies between the Ganges Plain and the Narbada-Son trough.
  - (21) The Rajput Upland Region is a complex region of hills and plateaus bounded on the south by the Vindhya Mountains and on the north-west by the Aravalli Hills.
  - (22) The Thar or Great Indian Desert lies between the Aravalli Hills on the south-east and the Indus-Punjab Plains on the north and west.

#### THE EASTERN HILLS REGION

The hills which lie along the borders of India and Burma sweep in a long curve from the far north-eastern corner of Assam to Cape Negrais on the south-west of Burma. Various names are applied to different parts of the hill belt ; in the north the comparatively narrow belt is known as the Patkoi or Patkai Hills. These broaden out to form the Naga Hills and to enclose the Manipur Plateau. Southwards the Lushai Hills, Chittagong Hills and Chin Hills are remarkable in that they consist of a succession of long parallel ranges separated by deep valleys. Still farther south the hill belt gradually narrows, forming the Arakan Yomas. Between latitudes  $25^{\circ}$  and  $26^{\circ}$  N. a broad arm of the hill belt runs westwards through Assam to the border of Bengal, forming the Khasi, Jaintia and Garo Hills and including the broad plateau on which Shillong stands. In physical and geological structure this tract differs considerably from the main belt.

Taking first the main hill belt, by contrast with the other parts of the mountain wall, the ranges of the Eastern Hills are low ; the highest peaks scarcely reach 10,000 feet, whilst the majority of the ranges do not exceed 6,000 feet in height. The region as a whole lies in the track of the main Bengal current of the monsoon and the ridges lie athwart or—except in the north—slightly oblique to the normal direction of the winds. The rainfall is consequently very heavy, but there are marked contrasts in a short distance between valley bottom and ridge-

top.<sup>1</sup> The parallel arrangement of the long unbroken ridges responsible for the inaccessibility of most of the region and the difficulty of communication between one valley and another. Normally the hill-sides are covered with dense evergreen forest of tropical species in the lower parts, evergreen oaks in the higher parts—whilst the ridge-tops are grassed. The hill tribes have, however, destroyed vast areas of the forest by burning off to obtain small patches for their shifting cultivation; useless

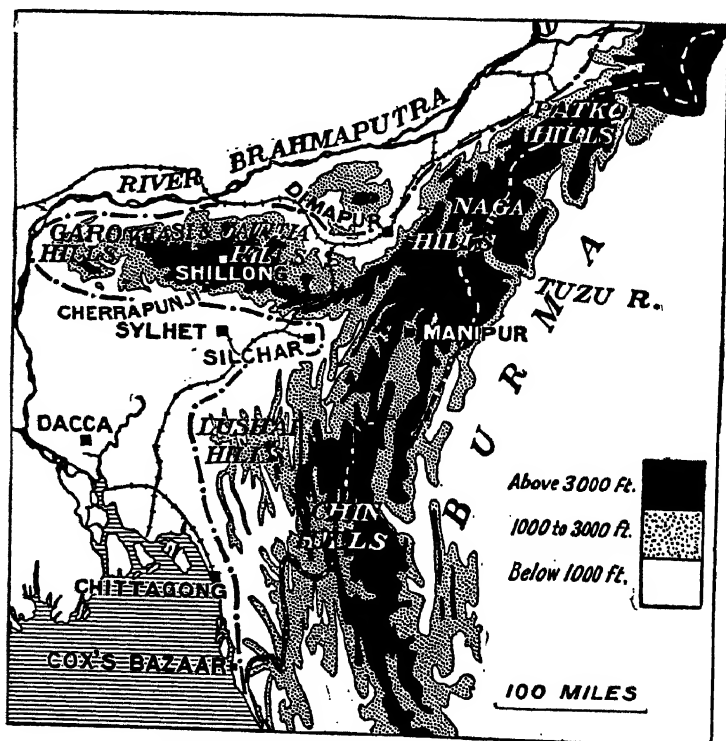


FIG. 116.—The Eastern Hills Region.

bamboo thickets now occupy the deserted clearings. Consequently the total area of useful forest is comparatively small. The physical controls which have resulted in the existing sparse population of small hill tribes are sufficiently obvious. The difficulty of communication between one valley and another, to be effected only by toiling up and down tortuous tracks, often not wide enough even for a pony or mule, explains the

<sup>1</sup> Compare also Manipur, on a plateau surrounded by hills, with an annual fall of a little over 60 inches only.

multiplicity of languages and the variety of customs found amongst such peoples as the Nagas, Chins and Chinboks. Except where Christianity has been carried by the indefatigable missionaries, Animism is the prevailing religion. Slavery, human sacrifice and head-hunting still survive or did till very recently; in the remoter parts are large tracts still classed as 'unadministered'. The small villages are usually placed on spurs, near a spring in the hill-side, but well situated in case of attack. On the near-by patches of cultivated land hill rice is the chief crop; only some of the more advanced tribes terrace the hill-sides. The torrential downpours which characterize much of the region in the wet season are apt to strip the clearings bare of both crops and soil. The little plateau which is occupied by the State of Manipur has a fertile soil and a good quantity of rice is grown—a little is even exported.

The Assam Plateau lies directly in the path of the monsoon, with the result that the southern slopes are credited with some

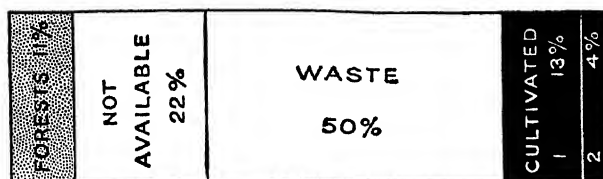


FIG. 117.—The classification of the land in the Eastern Hills Region.

As in all similar diagrams 'cultivated land' includes current fallows (marked 1, 13 per cent.) and land sown (2, 4 per cent.). The relative proportions of the two latter are especially noteworthy.

of the heaviest rainfalls in the world. Cherrapunji has nearly 500 inches a year, and in one year nearly a thousand inches fell. Over the crest, on the surface of the plateau, the rainfall rapidly decreases. Shillong, though only 30 miles from Cherrapunji, has only 83 inches. Although no railway yet climbs to the surface of the plateau, the Assam hills are far more accessible, less rugged and far more cultivated than the main part of the Eastern Hills region. On the northern slopes towards the Brahmaputra are some of the numerous tea gardens for which Assam is famous; a coarse kind of cotton is grown on the Garo Hills (and also on the Lushai and Chittagong Hills). Fruit trees such as oranges do well in the Garo Hills. Cultivation and settlement is spreading, for the population is still sparse and many of the Biharis who have worked as coolies in the tea gardens settle year by year in these tracts.

Taken as a whole the population of the Eastern Hills Region is between 50 and 60 to the square mile. The diagram shows

the apportionment of the land. The small percentage (about 4 per cent.) of cultivated land should be noted as well as the comparatively large proportion of fallow.

It is worth emphasizing once more that no railway or motor road yet connects India with Burma across this region. Of the through routes possible for bullock-carts, the Hukawng Valley Route and the Manipur Route are the chief. On the Indian side there is a railway which joins the upper part of the Assam Valley with the Bengal plains, running as far as the port of Chittagong. It crosses the hills as shown in Fig. 117. Branches run from this railway to Sylhet, from whence the rainy southern slopes of the Assam hills can be reached, and to the mouth of the Ganges-Brahmaputra. Shillong, the administrative centre of Assam, is reached by motor road from the north from the railway running along the Brahmaputra. The tortuous ascent of this narrow road on to the plateau made it necessary to institute one-way traffic—up for half the day and down for the other half.<sup>1</sup> The important state of Manipur is reached by a cart-road from Dimapur—a route which has been suggested for the railway communication between India and Burma. Chittagong may be regarded as the port of the region, whilst Cox's Bazaar, also on the coast, is the outlet for the portion of Bengal further south.

It will be gathered that the bulk of the region lies in Assam, stretching also into the south-east corner of Bengal (Chittagong Hill Tracts) and far into Burma.

### THE EASTERN HIMALAYAN REGION

The great curve of the Himalayas may be divided into two parts, an eastern and a western, mainly on a climatic basis. The eastern region may be taken as extending as far west as the western boundary of Nepal or to the Ganges River. Structurally it is simpler than the western tract and is characterized by a heavy monsoon rainfall.

It is characteristic of the Eastern Himalayas that they rise very rapidly from the plains. The zone of unhealthy foothills is comparatively narrow. Excluding the foothills and the Terai, the Himalayas in the east fall simply into two parts—the main Himalayan Range and the Lower or Outer Himalayas. Nearly everywhere the main ridge is 18,000 or 19,000 feet, and Everest, despite its height of 29,000 feet, seems to be only one of a chain of peaks. It falls to the lot of Kinchinjunga, especially when viewed from the favourite hill station of Darjeeling, to achieve fame as the most magnificent mountain in the world.

<sup>1</sup> But many improvements are planned or in hand, including a road from Shillong to Sylhet.

The third highest, its beauty is largely the result of its isolated position.

Darjeeling has a rainfall of rather over 100 inches, and may be considered characteristic of the eastern half of the Himalayas. It is an interesting experience, just before the break of the monsoon, to stand on one of the heights near Darjeeling and watch the clouds rolling up from the Bay of Bengal below the level of one's feet, obscuring the view across the plains below.

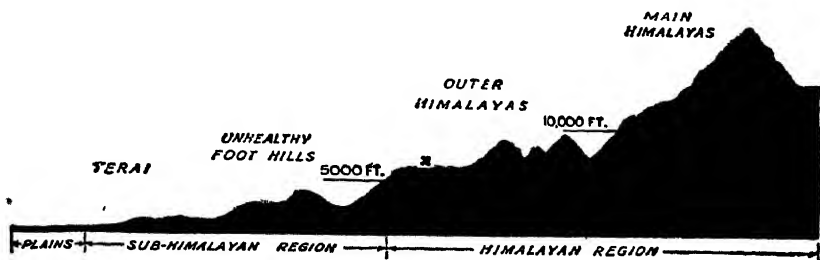


FIG. 118.—Section through the Eastern Himalayas.

The cross marks the approximate position of the Himalayan hill stations—as accessible from the plains as possible but beyond the belt of comparatively unhealthy hills of the sub-Himalayan region.

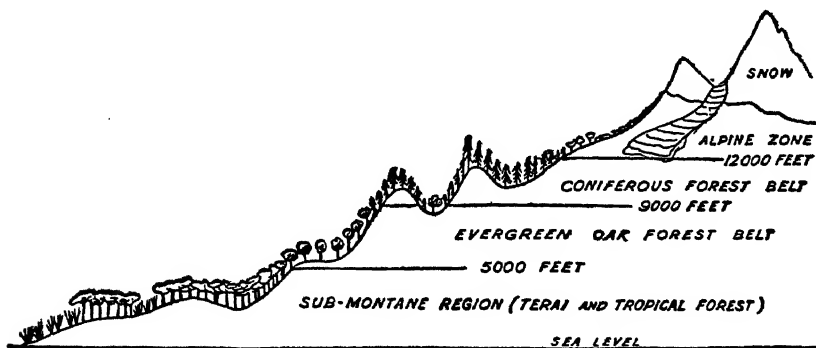


FIG. 119.—The vegetation belts of the Eastern Himalayas.

A little later and Darjeeling is enveloped in the clouds—a state of affairs which lasts nearly half the year.

Excluding the Sub-Himalayan strip below 5,000 feet, three vegetation zones may be distinguished :

- (4) Snow : above 16,000 feet.
- (3) Alpine Belt : 12,000 to 16,000 feet.
- (2) Coniferous Forest Belt : 9,000 to 12,000 feet.
- (1) Evergreen Oak Forest Belt : 5,000 to 9,000 feet.

In the Alpine Belt rhododendrons are important ; sometimes they grow in dense thickets, sometimes as forests of trees with

red, twisted stems, at higher levels merely a heather-like carpet. Just below the snow-line the only vegetation may be tufts of grass or mountain plants with a 'cushion habit'. Inaccessibility prevents forest exploitation to any extent.

**Population.** Naturally the density of population is low—almost everywhere less than 100 to the square mile and usually far less. The State of Sikkim, to give one example, has as a whole thirty people to the square mile. A few villages are scattered amongst the mountains; they are not large and consist simply of a few huts. Near by is usually a patch of cultivated land—forest cleared by burning and used for a few seasons only. Most of the hill people are Mongolians; there are numerous races and languages, with the result that Nepali has been adopted as the *lingua franca* of the mountains. The Nepalis are perhaps the most important of the hill peoples, though the ruling people in Nepal are the Ghurkhas—small, sturdy men, well known for their qualities as soldiers. In the State of Sikkim, which is included in the British sphere of influence, the Lepchas and Bhutias are important. It is interesting to notice that many of the peoples, though living amongst the mountains, hate the cold. The Lepchas, especially, usually build their villages in the warmer valleys.

The Eastern Himalayas lie in Nepal, the little State of Sikkim, the British District of Darjeeling and Bhutan.<sup>1</sup> *Katmandu* is the capital of Nepal and most of the population of Nepal is found in its vicinity. *Darjeeling* is an important hill station—the hot weather capital of Bengal and the centre of numerous tea gardens. It commands also the principal routes to Lhasa. Further east is *Kalimpong*, through which town wool is imported from Tibet.

### THE EASTERN SUB-HIMALAYAN REGION

Like the Himalayan Region, the Sub-Himalayan is divisible into eastern and western halves on a climatic basis. Lying between the level Gangetic Plains and the Himalayas, it is usually possible to divide the Sub-Himalayan Region into two parallel strips. The strip nearer the plains is level or undulating land only slightly raised above their level. It is, or was, swampy and usually covered with coarse, tall grass and is known as the 'Terai', or as the 'Duars' in Northern Bengal. Nearer the Himalayas the second strip consists of a belt of hills, including such groups as the Churia Ghati Hills of Nepal, the Dun Hills of Northern Bihar and the Sinchula Hills of Northern Bengal,

<sup>1</sup> See Lord Ronaldshay, *Lands of the Thunderbolt: Sikkim, Chumbi, and Bhutan* (London: Constable, 1923).



as well as the lower slopes of the Outer Himalayas. These ranges of foothills do not generally exceed 4,000 feet in height, and are usually covered with damp and unhealthy forest. Indeed, the whole of the Sub-Himalayan tract was an unhealthy, malarial region shunned by men, and had the additional disadvantage of frequent earthquakes. Gradually, however, drainage and cultivation have been pushed into the Terai. Along the northern fringe of the Ganges Plains there is a long line of towns—Saharanpur, Pilibhit, Kheri, Bahraich, Motihari, Jalpaiguri, etc., connected by railway, which may be regarded as 'frontier towns' and the bases of agricultural operations against the Terai. In the eastern half now under consideration the rainfall of the Terai varies from over 100 inches in the east to 40 inches in the west, so that it is ample for cultivation. Among the foothills there are naturally large local variations.

The characteristic vegetation of the hilly parts is a Monsoon Forest of the valuable Sal. The Sal flourishes especially on the cones of coarse gravel brought down from the hills and known as bhavar. The forest is interrupted over large areas by patches of coarse grass such as occur in the Terai. In the west there are numerous patches of dry thorn forest; in the wet east it is found that the Sal Forest occurs mainly on the ridges, rich wet tropical evergreen forest in the valleys.

In some parts the population in the Terai is still scanty, though tea gardens are well established in Northern Bengal and in the District of Jalpaiguri the density reaches 300. In the United Provinces much of the Terai is now cultivated, and in places the population reaches 500 to the square mile. The Sal Forests are an important source of timber.

### THE WESTERN HIMALAYAN REGION

The Western Himalayan Region includes Kashmir, and not only is the mountain chain itself far more complex than in the east, but the greater complexity is reflected in the vegetation and it is more difficult to separate vegetation zones. Broadly, four great parallel ranges of mountains can be distinguished:

The Muztagh-Karakoram Range.

The Inner Himalayas, or Zaskar Range.

The Middle Himalayas, or Pangi Range.

The Outer Himalayas, or Pir Panjal Range.

The Muztagh-Karakoram Range is the highest of all, and there are many peaks more than 25,000 feet high, of which K2 or Mount Godwin Austen is the loftiest, and probably ranks second in height amongst the mountains of the world. This great chain completely shuts off the bleak Tibetan Plateau beyond. The

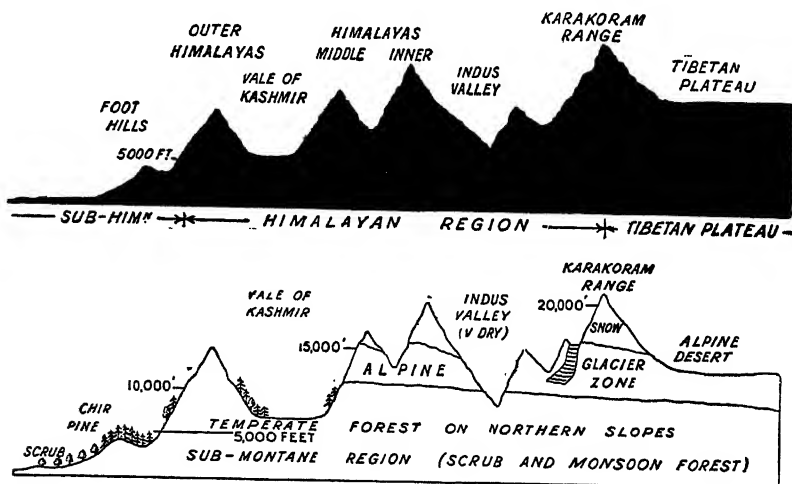
Karakoram Pass is the chief of the difficult passes and is followed by the path from Leh to Tibet.

The Inner Himalayas also form a great wall, with many peaks more than 20,000 feet high.

The Middle Himalayas are not quite so high, but many peaks exceed 15,000 feet.

The Outer Himalayas have an average height of 10,000 to 12,000 feet. Though the peaks are not much more than half the height of those in the Karakoram Range, it is this range, with its snowy crest, which occupies the horizon as a beautiful vision to the dweller in the Punjab Plains.

The Indus River rises in the Tibetan Plateau, and for a



FIGS. 120 and 121.—Sections through the Western Himalayas, showing the disposition of the ranges and the vegetation belts.

long distance flows between the great Karakoram Range and the Inner Himalayas. The Upper Indus Valley is very dry (Leh has but a few inches of rain and snow a year), for the lofty Inner Himalayas allow but little of the monsoonal influences to penetrate beyond. Below the town of Skardu the Indus passes through a tremendous gorge, is joined by the Gilgit, and turns southward, then west again and finally south until it cuts its way right through the mountains to the plains.

Between the Middle and Outer Himalayas is a valley different from most of the mountain valleys. In the first place, it is much broader, with a valley floor sufficiently wide to include the extensive Wulur Lake. This valley is the world-famed Vale of Kashmir. Through the vale wanders the Jhelum River,

are broad and navigable and unlike most Himalayan rivers. If there is one thing the world traveller learns, it is that few places on the earth's surface really live up to their reputation. Perhaps Kashmir is one of the exceptions. This is not the place to enlarge upon the charm of a leisurely journey by houseboat from Wular Lake to Srinagar, but it is one of those rare pleasures which is not overrated. The hill-sides owe much of their beauty to the wonderfully rich carpet of mountain flowers—especially at Gulmarg—whilst the more accessible hill-slopes are

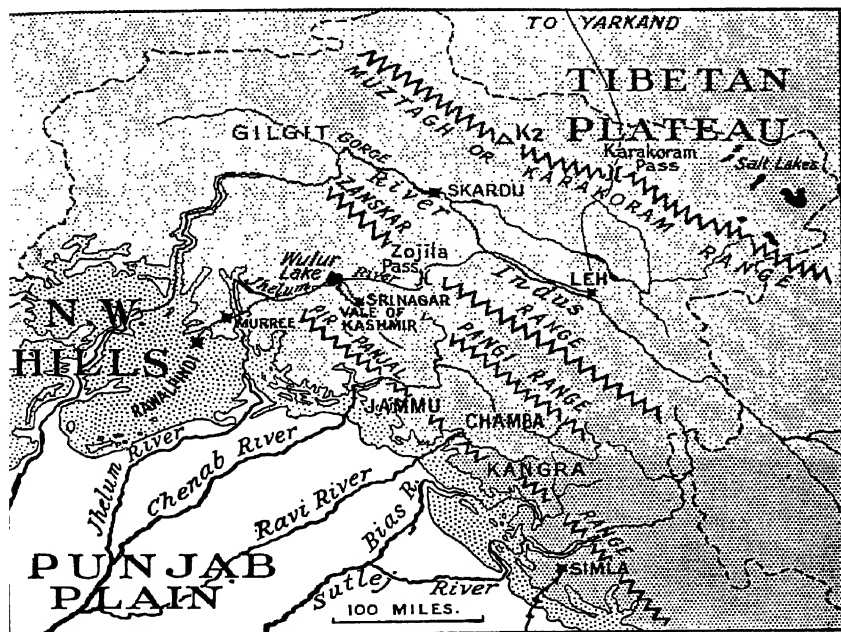


FIG. 122.—The western part of the Himalayan Region and Kashmir.

Land over 3,000 feet, closely dotted; land between 1,000 and 3,000 feet, lightly dotted.

covered with terraced fields of fine fruit trees—apples, pears and oranges. The land near the river suitable for cropping is very valuable, and it is in Kashmir that one finds floating islands. Rafts are made and covered with a little earth in which seeds are then sown. Not infrequently a man's land may aptly be described as lost, stolen, or strayed.

In popular parlance Kashmir is often used as if synonymous with the little Vale of Kashmir, which occupies but a very small part of the otherwise bare, rugged, mountainous State.

(Compare the Vale with a density of 183 and the Indus Valley with a density of 5.) *Srinagar* (173,573 in 1931), the capital, lies in the Vale and is famed for its wood-carving industry and the weaving of shawls. Srinagar is reached by road from Rawalpindi and Murree. Northwards from Srinagar the road to Leh crosses the Zaskar Range by the Zoji La Pass. Another pass reached by Srinagar is the Shipki Pass.

Out of the five rivers of the Punjab only the Sutlej rises beyond the Himalayas in Tibet and cuts right through. The others rise amongst the Inner or Middle Himalayas, but all cut through the Outer.

The Western Himalayas are drier than the Eastern. Simla, the well-known hill station and 'hot-weather capital' of India, has 62 inches; the total gradually decreases westwards and is often very low indeed in the deeper mountain valleys. Fig. 121 shows approximately the vegetation zones. The scrub of the plains begins to change in the Sub-Himalayan Region at a height of 3,000 feet. Rather below 5,000 feet the Himalayan Region is entered, and from 5,000 to 10,000 or 12,000 feet is found the temperate mountain forest. In the drier parts the forests usually clothe the northern sides of the mountains, where they have more shade, so that the snow lies longer and the moisture is not evaporated by the sun. The southern sides are often bare, stony slopes or covered with short grass and bushes. It is a little difficult to separate the mountain forest into two zones as in the Eastern Himalayas. It consists of a mixture of broad-leaved oaks and the needle-leaved pines and deodars. Broadly speaking, the chir pine (*Pinus longifolia*) of the lower slopes gives place upwards to the deodar (*Cedrus deodara*) and blue pine (*Pinus excelsa*), whilst above 8,000 feet spruce, silver fir and beech are found. Some of the forests of Kashmir are more accessible than those of the Eastern Himalayas. Logs of deodar and blue pine are floated down to the saw-mills on the plains.

The Kashmiris are the principal people of the Western Himalayas and naturally live in the more sheltered valleys. Rice is grown in tiny fields carefully levelled and irrigated at the bottoms of the valleys, other crops in minute fields on the hill-sides. Below 8,000 feet the most important crop is maize, but wheat can be grown up to this level. Buckwheat is grown in the poorer, stony soils. In the wilder parts, such as the Indus Valley, the only inhabitants are a few wandering shepherds.

The hill States in the northern part of the Punjab are similar to Kashmir in general features. On convenient spurs are found such hill stations as Naini Tal and Mussoorie, as well as Simla, already mentioned.

## THE WESTERN SUB-HIMALAYAN REGION

The western part of the region is much drier than the eastern, though it has a heavier rainfall than the adjoining plains. Again division into two strips can be made. The Terai is absent and the outer and lower strip includes the foothills such as the Shivalik Hills north of Delhi and the slopes of the mountains up to 3,000 feet. This strip is usually covered with a poor monsoon forest or scrub. The most interesting tree in the forest is *Butea*, known otherwise by various native names, such as chichra, dhak, and palah, and in English as 'Flame of the forest', from its red flowers. Probably much of the Sub-Himalayan Region was once dhak forest. It yields good firewood; gives a useful gum; dye can be made from the beautiful flowers, whilst the dried leaves form fodder for cattle. But the dry forests of this strip are still more useful for their yield of bamboo—of importance as a building material in the plains. The second strip extends from 3,000 to 5,000 feet above sea-level, and in it the chir pine is very common. This strip might, indeed, be considered the lowest zone of the Himalayan Region. Turpentine can be obtained from the resin of this tree.

The western part of the Sub-Himalayan Region is not so unhealthy as the wetter, eastern part. With a rainfall generally between 30 and 40 inches dry crops can be grown. Wheat and maize are the chief, but gram and millet are also grown and, in addition, much fodder. Cultivation is gradually being extended and the scrub forests are disappearing, with the result that the population density is, in the Punjab, now as high as 100 to the square mile.

It must also be remembered that the great irrigation canals of the Punjab Plains and the United Provinces take their water from the rivers just where those rivers leave the hills; hence there is a line of important irrigation works within the borders of the Sub-Himalayan Region. Other small towns serve as exchange centres where the dwellers in the hills meet, and exchange produce with, merchants from the plains. Special interest attaches to Hardwar, where the sacred Ganges emerges from the mountain gorges and which is hence a very important centre of pilgrimage.

## THE TIBETAN PLATEAU

It must be mentioned, in passing, that within the confines of the State of Kashmir a small portion of the Tibetan Plateau, described elsewhere, is included.

## THE NORTH-WEST DRY HILLS REGION

This natural region, also known as the North-West Frontier Region, coincides very roughly with the North-West Frontier Province, if we except the northern part which lies amongst the Himalayan tangle and if we add to it the Punjab Districts of Jhelum, Rawalpindi and Attock. The region is thus divided into two parts by the river Indus. To the east of the river lie the Salt Range and the dry, sandy plateau of Attock which form part of the Punjab; to the west of the river are the hills and mountains of the North-West Frontier Province, interrupted by a number of valleys.

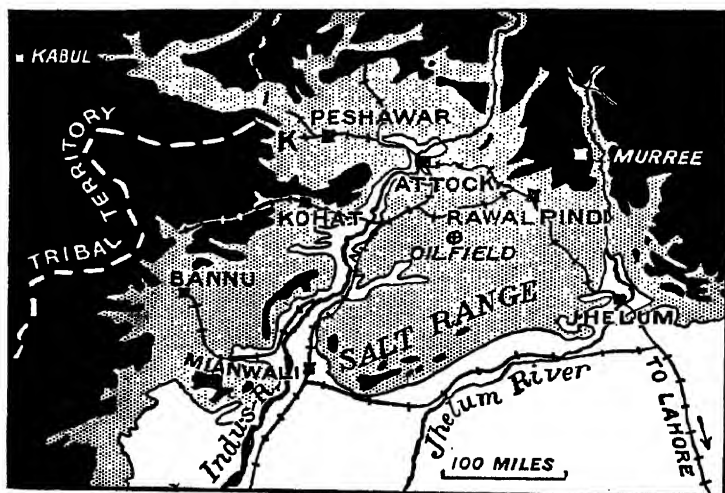


FIG. 123.—The Dry Hills Region of the north-west.

K = Khyber Pass. Land over 1,000 feet, dotted; over 3,000 feet, black.

The *Cis-Indus Tract* of the Punjab, or the part of the region to the east of the Indus, consists of a dry sandy plateau bounded by the Outer Himalayas on the north and terminated abruptly by the Salt Range, which overlooks the fertile Punjab Plains on the south. Only dry crops are possible, and millet is the staple food of this tract. Almost in the centre lies the little oilfield of Khaur.

The *Indus Valley* is a tract of land with considerable possibilities, but the harvests vary greatly with the extent of the floods from the river.

The *Trans-Indus Tract*, lying between the Indus and the hills of the frontier, consists of a series of three plains—Peshawar,

Bannu and Dera Ismail Khan—separated from one another by the low hills of Kohat and offshoots of the frontier range. The Vale of Peshawar is extensively irrigated and well wooded, presenting in spring and autumn a picture of waving cornland and smiling orchards framed by rugged hills. Adjoining Peshawar is the District of Kohat, a rough hilly tract intersected by narrow valleys. The southern spurs of the Kohat Hills fade away into the Bannu Plain. Where it is irrigated from the Kurram River, the Bannu Plain is very fertile, especially round Bannu itself. Where not irrigated, there are broad stretches of rough stony ground broken up by deep gullies cut by flood-water from the hills. Nearer the Indus River the plain becomes more fertile again, but its crops depend on the rainfall, which varies widely from year to year. A broken range of sandstone hills divides the Bannu Plain from the Daman or plain land of Dera Ismail Khan. This plain is a clay desert, but the soil is naturally fertile and in good rainfall years there is an abun-

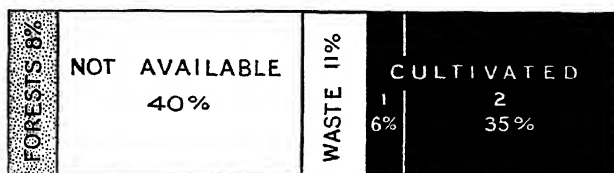


FIG. 124.—The classification of the land in the North-West Dry Hills Region.

See explanation in the text. As in all similar diagrams 'cultivated land' includes current fallows (marked 1, 6 per cent.) and land sown (2, 35 per cent.).

dant crop of grass. In these plains of Peshawar, Bannu and Dera Ismail Khan the summers are very hot and the winters very cold—frost occurs nearly every year. The plains, where fertile, are densely populated.

*The Frontier Hills.* To the west of the three plains just described lie the barren, treeless hills, inhabited by the warlike tribes of the frontier—Waziris, Afridis, and Orakzais—all belonging to the group of people known as the Pathans. Here and there are fertile valleys, such as the upper part of the Kurram Valley, and in them are little hamlets and sometimes forests of stately pine-trees. Some of the hill-sides in the valleys are clothed with grass and the people of Kohat keep large numbers of sheep. Elsewhere the hills of the frontier are inhospitable in the extreme. This tract is almost outside the influence of the monsoon, and most of the scanty rain falls in the cold season.

**Agriculture.** Fig. 124, which has been drawn to show the proportion of cultivated land in the region, does not include

the hills and mountains of the tribal tracts, but refers simply to the Districts of Jhelum, Rawalpindi, Attock, Peshawar, Kohat, Bannu and Dera Ismail Khan. It may seem surprising, in so dry a region, that forests are indicated as covering 8 per cent. of the area. This is largely a question of classification: most of the 'forests' are merely scrubland, but valuable because even the poorest timber and firewood have a value in such a dry country and the 'forests' are protected accordingly. The woodland is mainly in the north where the rainfall is slightly more than in the south. Nearly half the region, bearing in mind that we are dealing only with the more fertile parts, is occupied by hills, mountains and useless ground. The proportion of waste land which might be utilized is but small. Most of this 'waste land' is found in the plain of Dera Ismail Khan, as yet unirrigated. The cultivated land comprises both irrigated

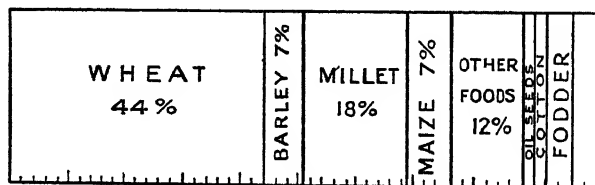


FIG. 125.—The crops of the settled parts of the North-West Dry Hills.

Most of the wheat is grown on irrigated land; the millet on land dependent on rainfall. This diagram, like all the others of a similar character in the section on India, has been constructed by taking the figures for all townships or tahsils lying within the natural regions concerned. For reasons of economy, the Government of India has ceased the publication of such detailed statistics and hence the diagrams are based on those for the latest year available, 1920-1 (*Agricultural Statistics for India*), due allowance being made where that season was an exceptional one. The diagrams are based on those drawn up for French and Stamp's *Regional Geographies of India*, Parts I, II and III.

land and land with dry crops. The most important irrigated areas are in the Vale of Peshawar, watered by the Government Canals known as the Upper Swat Canal, Lower Swat Canal, and Kabul River Canal. Many of the crops of the Bannu Plains are also irrigated, but on the sandy plateau of Jhelum and Attock mainly dry crops (millets) are grown. In the region as a whole wheat is easily the leading crop. Seen in the spring after a few showers of rain, the irrigated plains of Bannu or Peshawar present to the eye a vast waving sea of wheat, with here and there streaks or patches of darker coloured gram. After the harvest the same area has been described as 'a bleak, howling wilderness, fit home for the whistling heat-laden dust storm which often sweeps across its surface'. Millet is the chief dry crop. As in other parts of North-western India there are two harvests, the Rabi and Kharif.

**Population and Communications.** One of the great rail-



way highways of India—from Calcutta to Delhi and Peshawar—runs right across the northern part of this area. It crosses the Jhelum at Jhelum and the Indus near Attock, where that mighty river flows through a narrow gorge. Since 1925 the railway has been continued right through the Khyber Pass to the Afghan frontier. It was preceded through the gorge by a military road. Care should be taken to notice also the railway along the east bank of the Indus which serves to link up the strategic railways which commence on the west bank and run into the valleys of Kohat and the Kurram Valley (this railway runs to the frontier and is also connected directly with Peshawar) and into the Bannu Plain.<sup>1</sup>

Enough has been said to indicate the marked difference between the settled valley agriculturists and the frontier tribesmen. The enlistment of the latter in the British Army has done something to curb their natural desire for raiding—a time-honoured custom not yet dead.

*Peshawar* (121,866 in 1931) is the chief town and seat of government of the North-West Frontier Province. It controls the Khyber Pass and thus nearly all the trade between India and Afghanistan. Peshawar stands at one end of the route, Kabul at the other.

*Kohat*, *Bannu*, and *Dera Ismail Khan* are the natural centres of their respective plains and are military as well as trade centres.

*Rawalpindi* (119,284 in 1931) is the chief town of the Cis-Indus tract and is the starting-point for the principal routes into Kashmir and hence the centre for Indian-Kashmiri trade.

### THE PLATEAU OF BALUCHISTAN

Baluchistan lies outside the mountain wall of India and consequently outside the influence of the monsoon. It comprises several British Districts—in general the most fertile parts are under direct British administration,—and the large native States of Kalat and Las Bela. Physically Baluchistan comprises an arid plateau surrounded by a ring of mountains and forming a region of inland drainage; the arid Makran coast in the south; a tract of tangled mountainous country in the north-east continuous with the mountain frontier tracts of Waziristan and Afghanistan. South of the Bolan Pass Baluchistan also includes a fragment of the Indus Plains, but a portion not draining directly to the Indus. The total area of this huge tract is nearly 135,000 square miles

<sup>1</sup> On the communications of the North-West Frontier and their significance, see a short note (with map) in the *Geographical Review*, Vol. XVI, 1926, pp. 318-319.

—considerably more than the whole of the British Isles—but it has a total population of less than a million. British Baluchistan proper (tracts assigned to the British Government by treaty in 1879) covers 9,096 square miles; Agency Territories directly under British officers, 45,132 square miles; whilst the States of Kalat and Las Bela occupy the remaining 80,410 square miles.



FIG. 126.—Baluchistan.

The Plateau of Baluchistan varies from 1,000 to 3,000 feet above sea-level; most of the surrounding mountains reach over 6,000 feet. The country as a whole has been aptly described as consisting 'largely of barren mountains, deserts and stony plains; its climate is subject to the extremes of heat and cold, and the rainfall is uncertain and scanty'. On the plateau in Kalat State the average rainfall nowhere exceeds 10 inches, and some idea of its precarious nature may be gauged by stating

that taking a year at random three stations out of twenty-five recorded no rainfall at all in 1922, and four others less than an inch, although the 'averages' for these places ranged from 3 to 6 inches. The British districts and the north-east enjoy heavier falls, ranging up to 20 inches in exposed stations. The rainfall curve for such stations as Quetta (9·71 inches) is distinctly Mediterranean in type, with an insignificant secondary maximum in summer. Stations among the hills in the north-eastern extension of Baluchistan have both summer and winter maxima. Snow is usual in the higher parts in winter.

There are no large rivers which can be used for irrigation as there are in those parts of India where the rivers flow from the Himalayas; the rivers are short, rushing torrents which flow after rain, but are often dry for many months of the year. For the most part they drain into shallow lakes in the midst of the plateau—lakes which often dry up entirely in the hot weather.

With the lack of water and the extremes of heat and cold and the difficulty of cultivating sufficient crops to sustain life, Baluchistan is far from being an ideal country, and it is not difficult to explain the low density—six per square mile. The majority of the people are nomadic and belong to three principal races—the Brahuis, Balochi (or Biluchi) and Pathans—speaking different languages. The Brahuis in particular hate the scorching heat of summer and migrate to the mountains, driving before them their thousands of sheep and goats, their horses, cattle and camels. In the cold weather they return to the alluvial plains to find pasture for their flocks and herds there. In bad seasons, and often for every winter, many Brahui families march to Sind, returning in the spring. There are thus two main factors which have determined the retention of nomadic habits in Baluchistan,—one is the great extremes of heat and cold, the other is the lack of land which can be cultivated or irrigated and the consequent necessity of wandering from place to place to find food for man and beast. In summer the nomads live in 'jhuggi', shelters made of branches, or 'kizhdi', tents made of goat's hair matting or of blankets. In winter they may live in villages, in huts having walls of straw and mud, the roofs made with rafters of wood (when available), covered with matting of dried palm leaves or tamarisk. It is only in the towns that one finds buildings made of mud bricks dried in the sun.

The soil in some of the valleys and plains of Baluchistan is naturally very fertile, and in many areas the most has been made of the scanty water supplies available. The water from the mountain streams sinks into the ground at the foot of the hills some distance from where it might be of use in watering

good alluvial soils. Long tunnels, known as Karez, have been constructed to tap these underground supplies. Karez are common in Persia, but are not found in other parts of India. Land irrigated in this way is only found in a few parts of Baluchistan, but especially near Quetta, in the district known as Quetta-Pishin. Here the people are Pathans. A few of the level tracts of alluvium in Baluchistan are irrigated by flood-water from the streams. Indeed, in good seasons as many as three crops may be grown on the same piece of land. This is done by the Jatts, who live in the District of Kachhi. The most important crop in Baluchistan is *jowar* (millet); other crops include wheat, barley and rice, and fodder (lucerne, etc.) is grown for the cattle and sheep. Fruits, such as grapes, apricots, peaches, apples and melons grow well. Along the Makran coast dates, for which Panjgur is especially famous, provide food for man and beast. A little fishing is carried on along the coast itself.

Reference has already been made to the diversity of language in Baluchistan. Balochi, Pashto and Dehwari are the chief languages, but Jatki is growing in importance. They are all Iranian languages, and thus different from the majority of Indian languages. Most of the inhabitants of Baluchistan are Mahommedans. It is curious that the excess of men in numbers has resulted in the not uncommon custom of a woman having more than one husband. Infant mortality is high, and the population is not increasing.

There are really no indigenous towns in Baluchistan. Quetta<sup>1</sup> and Sibi are both of British origin. The strategic position of Quetta at the head of the Bolan Pass—by far the easiest route from India to Baluchistan—is obvious.

Across the deserts of Baluchistan there are numbers of old camel caravan routes. One of the most important of these routes, running along the north of the country and far into Persia, has now been replaced by a railway on the broad gauge (5 ft. 6 in.), which was completed in 1919 to the village of Duzdap in Persia.

Baluchistan is a fascinating country and a wealth of information on the country and its people is to be found in the Reports on the Census of India, especially for the Census Years of 1911 and 1921.

## SIND

With the exclusion of a strip of desert on the east, the natural region of Sind or the Lower Indus Valley corresponds closely with the administrative division of Sind which forms part of the Bombay Presidency.

<sup>1</sup> Destroyed by earthquake, 1935.

Sind has often been called the 'Unhappy Valley'. In the days of old, when India was invaded by the Greeks and the Arabs, the invaders had marched for long, weary days and weeks through the desert wastes of Persia and Baluchistan, the Valley of



FIG. 127.—Political map of North-western India.

Native states are stippled. 1 = the larger Native States having relations direct with the Government of India; 2 = the smaller Native States having relations with the governments of the provinces in which they are situated.

the Indus seemed a shining promised land. But the epithet reflects the uncertainty of life in a land of deficient and irregular rainfall, largely dependent for water on the extent of river floods. Sind consists of a broad, dry alluvial plain stretching from the edge of the Baluchistan Plateau (the Kirthar Hills) on the west

to the Thar Desert on the east. Running through the centre of the plain is its life and soul—the Indus River. Just as Egypt is the 'Gift of the Nile', so may Sind be described as the 'Gift of the Indus'. Some distance below the point where the Indus leaves the Punjab it flows through a rocky gorge which is

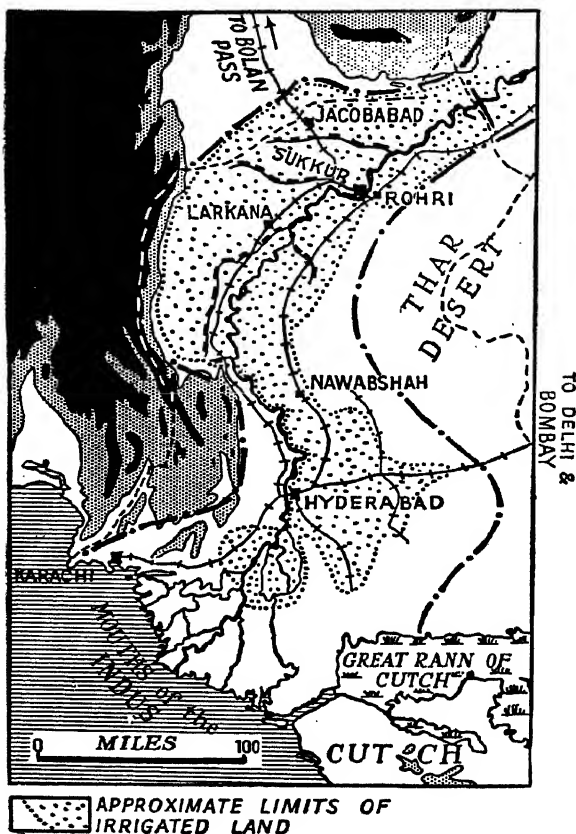


FIG. 128.—Lower Indus Valley.

The heavy boundaries shown are those of the natural region.

important in several ways. It separates the Punjab Plains from the Plains of Sind; it affords a good foundation for the railway bridge of Rohri and for one of the largest irrigation dams in the world.

A considerable part of Sind has an average rainfall of less than 5 inches a year, and even the coast has but little more. It

follows that agriculture depends almost entirely upon irrigation, but until recently the irrigation was by means of inundation canals. Water spills over from the river Indus into the canals when the river is in flood, but later in the year they become dry. Moreover, there is great danger of deficiency of supply

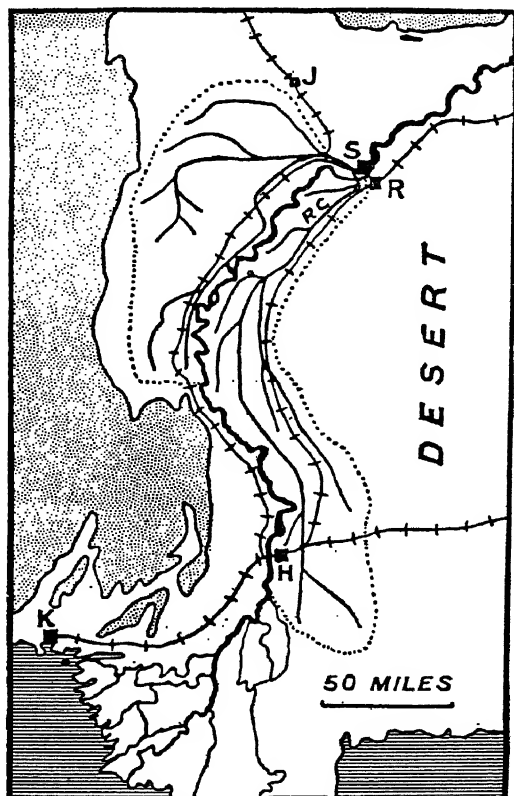


FIG. 129.—The Sukkur or Lloyd Irrigation Scheme, completed in 1932.

S = Sukkur; R = Rohri; J = Jacobabad; H = Hyderabad; K = Karachi. The canals are shown by plain lines; the approximate boundaries of the land to be irrigated are dotted. Land over 500 feet stippled. This map should be compared carefully with Fig. 128 which shows the area formerly irrigated by inundation canals and other means.

in those years when the river fails to reach its normal flood level. For many years a great scheme was under consideration to replace the inundation canals of Sind by a system of perennial canals. The scheme, known as the Lloyd or Sukkur Barrage Scheme, was completed in 1932. A huge dam has been built across the river Indus below the town of Sukkur and an

area of 7,500,000 acres will be irrigated (5,500,000 annually)—equal to considerably more than the total cultivated area of Egypt. The estimated cost is over £15,000,000.

Away from the irrigated land, Sind is a lonely barren desert. Here and there are the remains of canals no longer used and of cities long since deserted. There are deep, dry valleys which were once occupied by branches of the Indus. Probably the main stream of the Indus once flowed much further to the east.

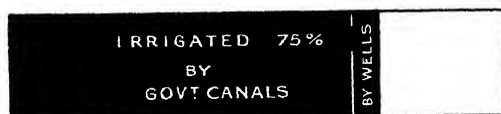


FIG. 130.—Diagram showing the proportion of the cultivated land of Sind which is irrigated. Seventy-five per cent. of the whole is irrigated, the bulk by Government canals.

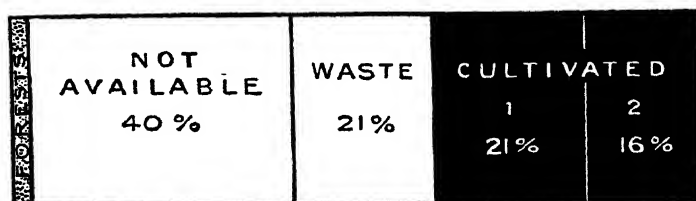


FIG. 131.—The classification of the land in Sind.

Cultivated land includes current fallows (marked 1, 21 per cent.) and area actually sown (2, 16 per cent.).

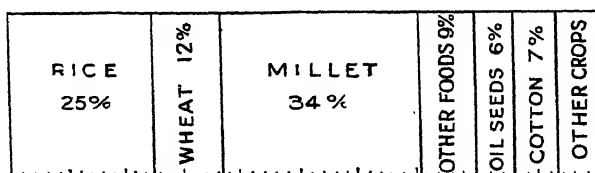


FIG. 132.—The crops of Sind.

(See note to Fig. 125.)

than it does now, and emptied itself into the Great Rann of Cutch. The old course is marked by a broad valley, but is quite dry. The Rann of Cutch is an interesting region. It was once an inland sea, but was gradually filled up by mud and sand brought down by rivers. It is no longer an arm of the sea, but merely a marshy area, almost completely dry in the hot season. It is still being filled up by sand blown from the Thar Desert, and soon it will be dry, barren desert.

It is interesting to notice that the Delta of the Indus is not



irrigated—a curious contrast to the rich rice-growing deltas of the Ganges, Irrawaddy, Mahanadi, Godavari and Kistna Rivers. There is excellent pasture in parts of the Indus Delta, but much of it is a useless, waste region, almost uninhabited. Near the coast it is flooded by the waters of the river and the sea in the hot season and in the cold season is a waste inhabited only by wild birds. Further inland is a strip of desert where once flourished cities and ports.

**Agriculture.** Nearly three-quarters of the crops of Sind are irrigated. The high proportion of fallow illustrates the disadvantage of dependence on inundation canals but is likely

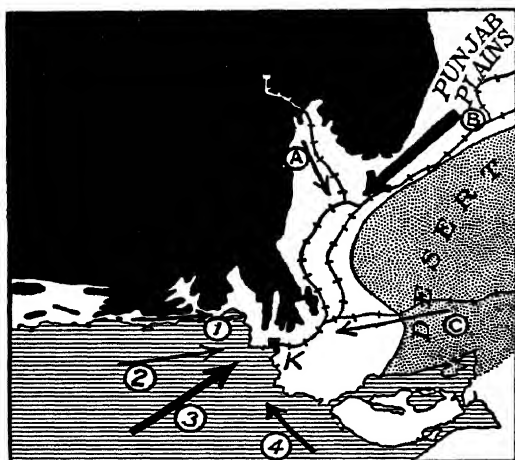


FIG. 133.—Position of Karachi.

Land over 1,000 feet shown black; the desert, dotted. The principal sea routes serving Karachi are those along the Makran Coast (also a land-caravan route) marked 1 above; from Basra and the Persian Gulf (2); from Aden and the Red Sea (3); from Bombay (4). The main routes from the hinterland to the port are those from the Punjab by railway (B); that from Baluchistan via Quetta and the Bolan Pass (A), and that from Delhi and Agra via Hyderabad and the desert (C).

to decrease greatly in the near future. Rice, wheat, millet and cotton are the leading crops.

**Population.** Formerly the ports of Sind were small towns in the delta, but they are now entirely replaced by the great port of Karachi. Karachi is situated to the west of the delta and has a natural rock-girt harbour. It serves as the outlet not only of Sind but of most of the Punjab, and has grown so rapidly in importance in recent years as to rank third amongst the ports of India. The communication between Karachi and its hinterland is by railway; the direction of the main lines should be carefully noted. Karachi is, of course, the great wheat port

of India and also exports much cotton. By contrast with Bombay the dry climate of Karachi is in the main responsible for the absence of modern cotton mills. Hyderabad, the lowest point where the Indus has been bridged, and Sukkur are the other two towns of note in Sind.

### THE PUNJAB PLAINS <sup>1</sup>

The word 'punjab' or 'panjab' is a Persian word meaning 'five waters' or 'five rivers'. The Punjab Plains are really the valley plains of the five rivers—Jhelum, Chenab, Ravi, Bias

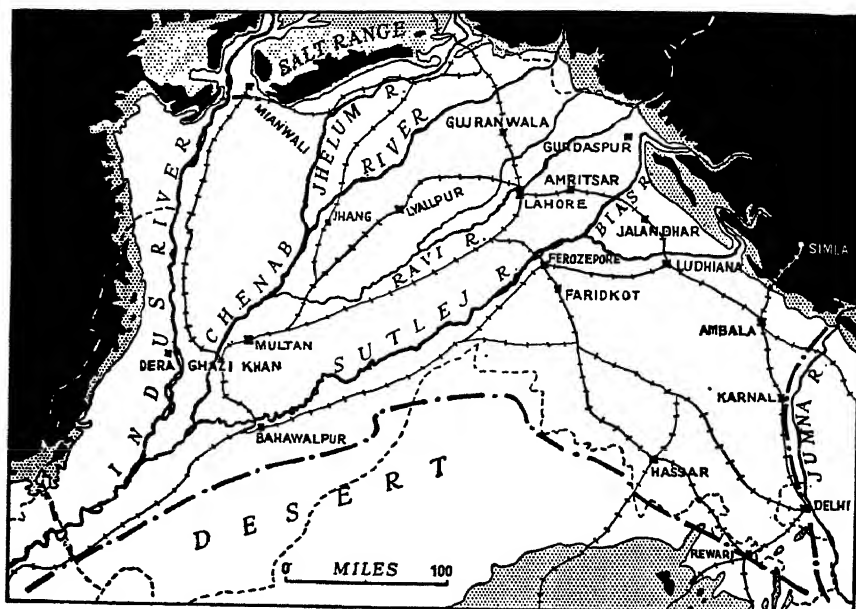


FIG. 134.—The Punjab Plains.

The heavy dot-and-dash line indicates the limit of the natural region, the lighter broken line the limit of the province. Land over 1,000 feet, dotted; over 3,000 feet, black.

and Sutlej. These five rivers all rise among the snow-clad heights of the Himalayas and flow broadly in a south-westerly direction before joining to form the Panchnad, which eventually joins the Indus near the south-western border of the province. The Indus itself, though flowing for some distance through the west and south-west of the province, plays an insignificant part in its economy. In the dry season the rivers of the Punjab

<sup>1</sup> The Punjab includes also portions of the Himalayan, Sub-Himalayan, North-Western Hills and Desert Regions, but the Punjab Plains constitute the largest and by far the most important part of the Province.

Plains are shallow and sluggish, occupying but a small portion of their wide beds, but in the rainy season, when the warm sun of April and May has melted the Himalayan snows and the monsoon rains are pouring down on the mountain slopes, the rivers become rushing torrents often miles wide. The rush of water does not always follow the same channel. The river may leave its old bed, and in a single night destroy miles of fertile fields, cutting for itself a new channel. Between the rivers (the *doab*) there is usually a flat, alluvial plain covered with cultivated fields, but where the land rises even a little between the rivers the water-table is lowered, irrigation becomes difficult and a scrub-covered waste takes the place of fertile fields.

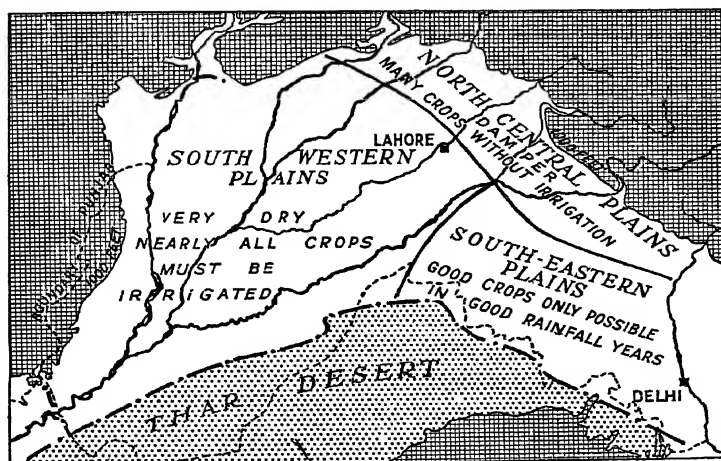


FIG. 135.—Map showing the threefold division of the Punjab Plains.

On the north-west the Punjab Plains end abruptly against the Salt Range and on the north-east stretch to the foothills of the Himalayas. It is the tracts near the mountains which sometimes suffer severely from earthquakes. On the east the Punjab Plains fade across the almost imperceptible divide into the Gangetic Plains; it is sufficient to take the boundary between the Punjab and the United Provinces as marking the limit. To the south of the Sutlej River, the land begins to rise very gradually and becomes drier and drier till it passes into the barren waste of the Great Indian Desert. In the south-west the desert approaches close to the Indus on the one hand as the southern end of the Sulaiman Range does on the other, and the constriction naturally separates the Punjab Plains from Sind. Through-

out the whole of the Punjab Plains hills are completely absent. The soil is everywhere alluvial; the 'kankar' nodules are the only stones available.

**Climate.** From their northerly position the Punjab Plains become cold in winter—with an average temperature of less than 60° in January—but, as already noted, become the hottest part of India in June and July. Frost is frequent at night in winter. The region of greatest heat (with the highest recorded summer temperatures in the world) lies in the south-west and forms the heart of the low-pressure centre towards which the monsoon winds flow. The south-western parts of the plains have a very small and irregular rainfall, averaging in some stations even less than 5 inches. Towards the north and east

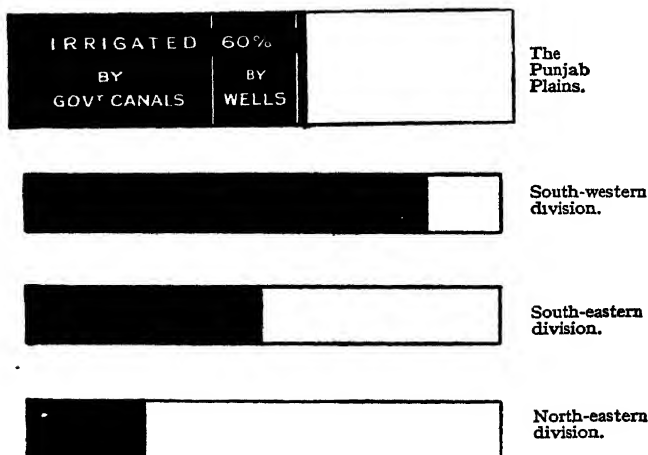


FIG. 136.—Diagrams illustrating the proportion of cropped land which is irrigated in the Punjab Plains as a whole and in the three divisions.

the rainfall increases and a characteristic feature of the northern part of the plains is the considerable fall from winter cyclones. It is mainly on a climatic basis that the Punjab Plains can be divided into three separate areas or sub-regions.

- (a) The North-Eastern or North Central Plain. This is the wettest part of the plains (along the foot of the mountains) and has a rainfall of between 20 and 30 inches. A very large number of wells are found in this region and it is possible to grow many crops without canal irrigation.
- (b) The South-Western Plain. This includes the driest parts, with a usual rainfall of only 5 or 10 inches. It is almost impossible to grow any crops without irrigation.

(c) The South-Eastern Plain. Here again the rainfall averages between 20 and 30 inches, but varies very much from year to year. In good years many dry crops can be grown, but in bad years none.

**Irrigation.** It will be gathered that irrigation is absolutely necessary over a very large part of the plains. Without it much of the Punjab would be as barren as the Great Indian Desert. Indeed, it is not always realised that over much of the now productive land of the Punjab Plains the rainfall is actually less than in the barren wastes of the desert. Irrigation is carried on in four principal ways—by wells, by tanks, by inundation

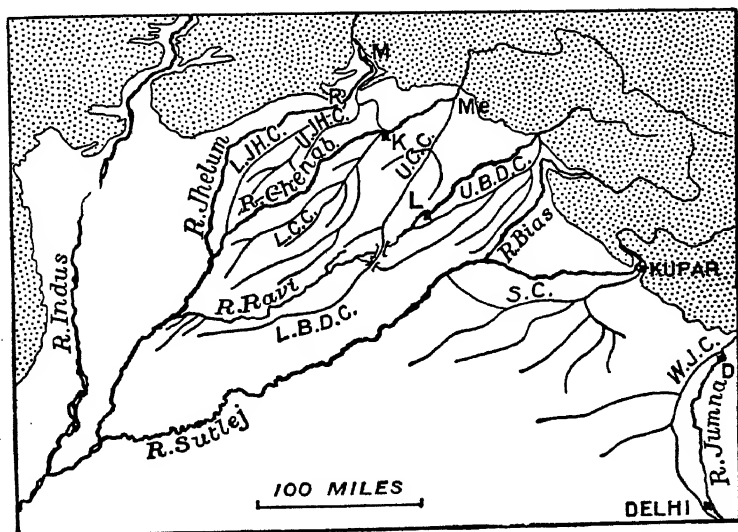


FIG. 137.—The Punjab Canals.

For explanation, see the text.

canals and by permanent canals. Some of the irrigation works date from very early times, but large works are only possible under a stable Government exercising control over extensive areas. The Government of India, since India became part of the British Empire, has spent enormous sums of money in improving old canals and more especially in building new ones. No less than 13 million acres are irrigated,<sup>1</sup> or 51 per cent. of all the cultivated land of the whole province, or 60 per cent. of all the cropped land of the Punjab Plains. This is more than all the arable land of England and Wales. Government-owned canals are the most important factors in irrigation.

<sup>1</sup> In 1893 the total was less than 3,000,000.

**Canal Systems.** In the Punjab Plains there are six main canal systems:

- (a) The Western Jumna Canal takes its water from the Jumna, near where that river leaves the Himalayas. This is an old canal which has now been rebuilt and much improved.
- (b) The Sirhind Canal takes its water from the Sutlej River and, like the Western Jumna Canal, it waters the south-eastern part of the Punjab Plains.
- (c) The Upper Bari Doab Canal takes its water from the Ravi River near Madhapur, where the river leaves the Himalaya Mountains. It waters the upper or northern part of the Bari Doab or the region between the Beas and Ravi Rivers. Notice the derivation of the word Bari.
- (d) The Lower Chenab Canal ranked at the time of its construction amongst the largest irrigation works in the world. It derives its water from that impounded by a great weir across the river Chenab at Khanki. It waters nearly  $2\frac{1}{2}$  million acres in the lower part of the Rechna Doab or the region between the Ravi and Chenab Rivers.
- (e) The Lower Jhelum Canal takes its water from the Jhelum at Rasul and waters part of the Rechna Doab (between the Jhelum and Chenab Rivers).
- (f) The Upper Chenab—Lower Bari Doab Canal System—is also known as 'The Triple Project', and is one of the cleverest examples of irrigation in the world. The Upper Chenab Canal takes its water from the Chenab at Meral, at the foot of the Himalayas. It waters the upper part of the Rechna Doab, but the main canal is carried by an aqueduct across the Ravi River and becomes the Lower Bari Doab Canal, watering the lower part of the Bari Doab. But when this scheme was arranged it was found that so much water would be taken from the Chenab River by the Upper Chenab Canal that insufficient would be left in the river to fill the existing Lower Chenab Canal. And so the Upper Jhelum Canal was built to bring water from the Jhelum to the Chenab at Khanki and to help supply the Lower Chenab Canal. The Upper Jhelum Canal also waters part of the Rechna Doab. The whole great system was only completed a few years ago.

The absence of canal irrigation in the large tract (the Sagar Doab) between the Indus and the Jhelum-Chenab should be

noted. This is due mainly to the topography of the ground, which rises slightly above the general level of the plains and renders irrigation difficult. It is important to notice the arrangement of canals in a great irrigation system and a map has been included to illustrate the point. It may be remarked, in passing, that a large proportion of the water distributed over the land

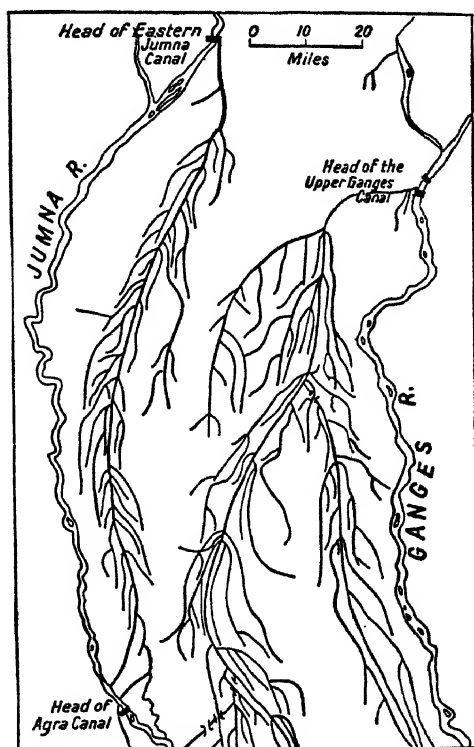


FIG. 138.—Fragment of a canal map of the northern part of the Ganges—Jumna Doab—showing the arrangement of main canals, branch canals and distributaries. The arrangement is roughly the *reverse* of that of a river and its tributaries.

eventually soaks back into the river courses, thus, although the Upper Jhelum Canal may take nearly all the water in the Jhelum at Mangla, there is sufficient lower down to supply the Lower Jhelum Canal. This phenomenon will be found to be of vital importance in the United Provinces.

**Agriculture.** The most important crop of the Punjab Plains is wheat—occupying between one-quarter and one-third

of the whole cultivated area.<sup>1</sup> Another important crop is millet, often grown on the same ground as wheat, the wheat being grown as a winter crop and reaped in the spring; the millet utilizes the monsoon rainfall and is ready for reaping in the autumn. Much millet is also grown as a 'dry' crop where wheat cannot be grown. Wheat and millet, together with maize, form the staple food of the people. The bulk of the wheat exported from India is grown on the Punjab Plains. Barley is another important crop and some is also exported. Other crops grown largely for export are oil-seeds. Sugar occupies considerable acreage in the north-eastern part of the plains but is less important than in the United Provinces. By far the

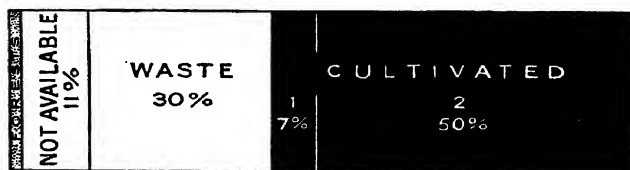


FIG. 139.—The classification of the land in the Punjab Plains.

1 = current fallows; 2 = area sown.

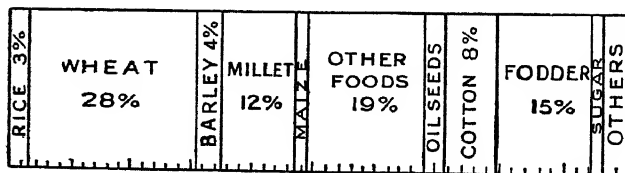


FIG. 140.—The crops of the Punjab Plains.

most important crop not grown for food is cotton, and it is on the irrigated land of the Punjab that most of the American cotton of India is grown. The large acreage under fodder is explained by the need, in such a dry region, of supplementing food naturally available for the cattle which are needed in large numbers for ploughing.

**Population.** Agriculture affords subsistence to more than 60 per cent. of the population of the Punjab. The people live

<sup>1</sup> The natural regions used in this book do not, of course, correspond with any of the great administrative divisions. The proportions of crops in each natural region are therefore calculated by taking the acreage figures for all the Administrative Districts lying within the natural region. Detailed statistics for these Districts have not, for reasons of economy, been published for the last few years and the last available (1920-21 and 1921-22) have been made the basis of the calculations.



mainly in small villages scattered over the plains. The huts are built of mud or mud and wattle—a direct result of the absence of stone in the great alluvial plain. The flat roofs of the huts, made of rough branches coated with mud, reflect the dryness of the climate. In days gone by the peaceful cultivators of the Punjab suffered much from robbers who swept down upon them from the hills, and this resulted in their herding together in villages for greater safety. Though the cause is removed the result remains; there are few of the isolated farms so common in the Ganges Delta. But of a population of nearly 25 million, only 13 per cent. live in towns of more than 5,000 inhabitants. In the whole of the Punjab Plains only four towns have more than 100,000 inhabitants, and five between 50,000 and 100,000.<sup>1</sup> The persistence of corporate village life may be gauged by stating that hand-loom weaving ranks next to agriculture in the number of workers it claims—over a quarter of a million. Leaving aside Delhi for separate treatment, the cities of the Punjab Plains can be divided into two groups:

- (a) The great cities of the past, famous religious centres or ancient capitals, such as Lahore, Amritsar (the old Sikh religious centre) and Multan.
- (b) Cities of modern origin or old cities which have adapted themselves to modern needs and form collecting centres for agricultural produce or have developed manufactures of their own. Examples are Ambala, Lyallpur and Gujranwala.

*Lahore* (429,747 in 1931) is the largest town, an old capital and the seat of Provincial Government. It has become an important railway centre and no less than 30,000 people are supported by the railway industry.

*Amritsar* (264,840 in 1931) is less ancient than Lahore, but is famous as the stronghold of the Sikhs who stood out against the Mahommedans in the eighteenth century. It suffers badly from fever, due largely to the stagnant water which soaks into surrounding hollows from the Upper Bari Doab Canal. The small manufacture of carpets and of other goods is less important than formerly.

*Multan* is the natural collecting centre for the south-west of the Punjab. It is a very old town, with old local industries. Afghan traders still visit the town and exchange their raw silk, fruits and spices for piece goods. Population: 119,457 in 1931.

*Lyallpur* and *Ludhiana* both have modern cotton-mills; the former is a fine new town with a large wheat trade, the wheat being collected for dispatch to Karachi.

<sup>1</sup> As with similar towns in many parts of India, several of these decreased in size in the decade 1911-21. But this was partly due to the terrible influenza epidemic of 1918-19, and in the decade 1921-31 there has been a rapid increase in urban population almost throughout India.

*Gujranwala* is an active trade centre ; *Ambala* a modern town of British origin and a railway junction.

*Patiala* deserves mention as one of the largest towns in a native State and a trade centre for the South-eastern Punjab.

*Sialkot* (100,573 in 1931) in the Rechna Doab is near the Himalayan foothills.

### DELHI

Since Delhi was made the capital of India in 1912, the district around has been separated from the Punjab and at the same time is independent of the United Provinces on the east. The little province of Delhi lies almost on the divide between the Indus drainage basin and the Ganges drainage basin—to be precise, the city itself lies on the west bank of the Jumna River and hence in the Ganges Basin, but it is convenient to deal with Delhi before considering the Ganges Plain. Delhi is the fifth city of India in size and has over 450,000 inhabitants. It owes



FIG. 141.—The position of Delhi.

T = The Thar or Great Indian Desert. Land over 1,000 feet, dotted ; over 3,000 feet, black.

its importance in the main to its strategic position. It stands at the head of both the great divisions of the Hindustan Plain—the great fertile plain of the Ganges and the great plains of the Punjab. From Delhi any place in the plains is easily accessible. Further, Delhi lies where the great desert and the hills of the plateau on the south approach somewhat closely to the Himalayan chain. As shown in Fig. 141 it was inevitable that the invaders of India from the north-west would avoid crossing the desert and be compelled to pass near the site of Delhi before they could reach the fertile plains of the Ganges. So in the past Delhi has often been the capital of India. Standing on the Jumna, Delhi was at the 'head of navigation' of that great river and boats could go all the way from Delhi to Calcutta. The land routes from the north-west there joined the water routes of the north-east. In modern times railways have largely replaced land and river routes, and Delhi has become a great

ailway centre, easily accessible from all parts of India. Irrigation has increased the fertility of the surrounding lands ; much cotton is grown and sent to Delhi, where there are now modern cotton mills. The new capital, with its magnificent buildings, stands a short distance from the old city. At a convenient distance, to the north of Delhi, on the healthy heights of the Himalayas, is Simla, the hot-weather seat of Government, whither the Government migrates annually from Delhi.

### THE UPPER GANGES PLAIN

The Punjab Plains fade imperceptibly eastwards into the Ganges Plains. From Delhi, which has a rainfall of 25 inches, there is a gradual increase in precipitation as one goes down the Ganges Valley. The 40-inch rainfall line passes through Allahabad and may be taken as roughly the limit, except for a strip along the northern part near the Himalayas, of the natural region which we have called the Upper Ganges Plain. The climate is thus damper and at the same time less extreme than

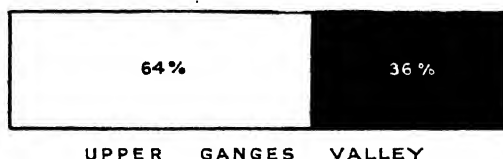


FIG. 142.—Diagram showing the proportion of the cropped land in the Upper Ganges Valley which is irrigated (irrigated land in black).

in the Punjab. The region lies between the Sub-Himalayan strip in the north and the slopes of the Central Indian Foreland, which commence just to the south of the Jumna River, in the south. Delhi is only 700 feet above sea-level and the hill-less plain slopes imperceptibly towards the east (Allahabad, 400 feet). Obliquely across it from north-west to south-east flows the Ganges ; near the western and southern boundary is the Jumna. Nearly half the region lies therefore in the Doab between the Ganges and Jumna.

**Irrigation.** Taking the region as a whole, 36 per cent. of the crops are grown on irrigated land. In the Doab the proportion rises to 50 per cent., in the District of Meerut reaching 57 per cent. There are at present five chief canal systems :

- (a) The Eastern Jumna Canal takes its water from the Jumna River near Fyzabad, just where the river leaves the mountains.
- (b) The Agra Canal takes its water from the Jumna River just below Delhi.

- (c) The Upper Ganges Canal takes its water from the Ganges near the sacred spot of Hardwar, where the river leaves the mountains.
- (d) The Lower Ganges Canal takes its water from the Ganges at Narora.

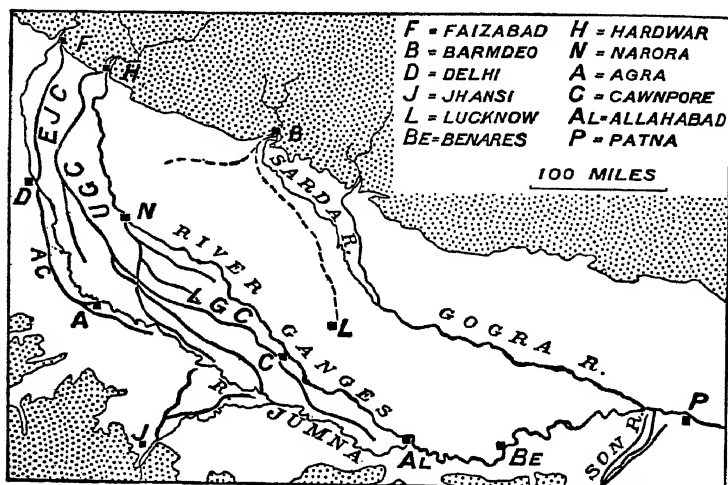


FIG. 143.—The irrigation canals of the Upper Ganges Valley.

EJC = Eastern Jumna Canal; AC = Agra Canal; UGC = Upper Ganges Canal; LGC = Lower Ganges Canal. The very important canal system deriving its water from the Sarda River at Barmdeo was completed in March, 1930. For Faizabad, read Fyzabad. See also Fig. 138.

It should be noted that the Eastern Jumna, Upper and Lower Ganges Canals irrigate the Ganges-Jumna Doab, but the Agra Canal waters the land south of the Jumna. North of the

NOT AVAILABLE 16%	WASTE 15%	1 8%	CULTIVATED
			2 61%

FIG. 144.—The classification of the land in the Upper Ganges Plain.

Notice the complete absence of forests and the very high proportion of cultivated land.

Ganges the irrigation was almost entirely from wells and tanks, but a big weir has now been built across the Sarda River near Barmdeo. The canal from this weir irrigates the country to the south-east as far as Lucknow.

**Agriculture.** Largely as a result of irrigation, the pro-

portion of cultivated land in this region reaches the high figure of 69 per cent. Double-cropping is usual on the irrigated land, wheat being a leading winter crop. Fig. 147 has been drawn to show comparatively the crops in the three regions of the

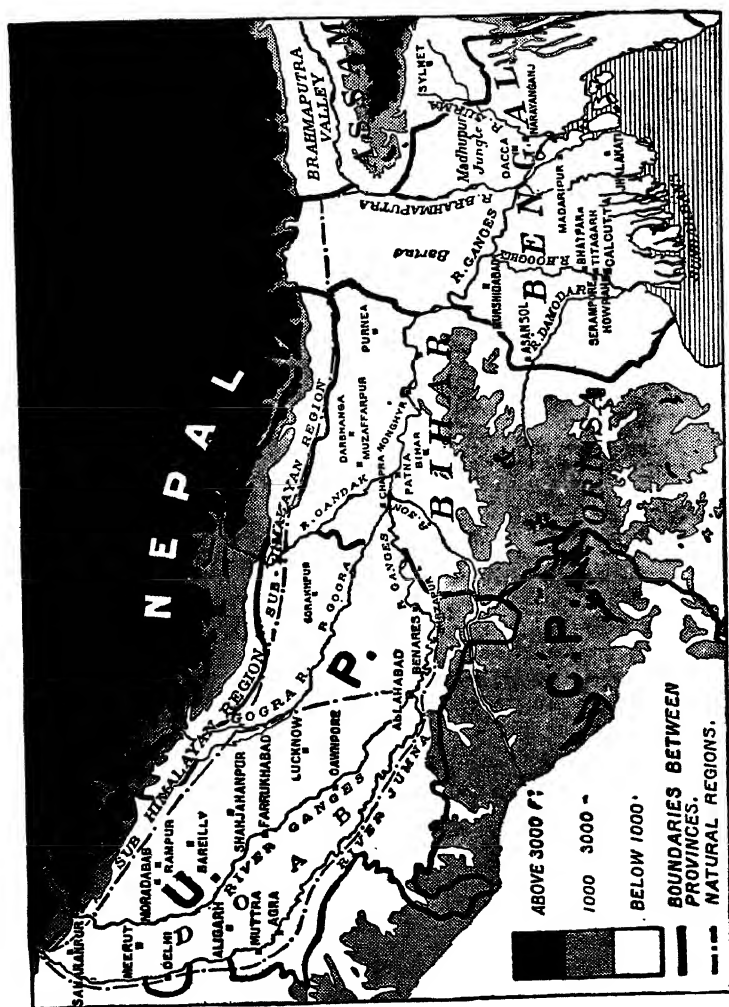


Fig. 145.—The Ganges Plain. Scale 188 m. = one inch.

Ganges Plain. Everywhere in the Upper Ganges Plain wheat and barley together occupy a larger area than rice. Some of the driest districts grow no rice at all. In common with other dry regions millet is an important crop, here ranking second only to wheat. Other food crops include maize, gram and various

pulses. Sugar-cane is grown in most parts of India and, although it occupies only a small area when compared with other crops, the region now under consideration is the most important for sugar-cane in India. By far the most important crop not grown for food is cotton. Agra and Delhi are the two chief centres of modern cotton manufacturing. Fodder is an important crop because, for its size, the Upper Ganges Plain has more cattle than any other region of India. Dairy farming—generally so unimportant in India—is an industry of importance in certain districts, Aligarh in particular being well known for its butter. By contrast with cattle, sheep and goats are not numerous as there is little waste land on which they can be pastured.

**Population.** The region compares closely with the Punjab Plains in that 88 per cent. of the population live in villages of less than 5,000 inhabitants, and in which the huts are of mud or mud and wattle. There are only seventeen towns with a population of more than 50,000 people.<sup>1</sup> Again there is the two-fold division into :

- (a) The great cities of the past—famous religious centres or ancient capitals such as Lucknow, Allahabad and Muttra.
- (b) The cities which have adapted themselves to modern needs, forming collecting stations for agricultural produce or having modern factory industries. Examples are Cawnpore, Meerut and Moradabad. Included in this group are the 'frontier' towns on the border of the Sub-Himalayan Region, such as Saharanpur.

*Lucknow* is an old capital and still the largest city of the province. It is an important railway centre and has some small manufacturing industries, and is again growing in size.

*Allahabad*, situated at the junction of the Jumna and the sacred Ganges, is a very important place of pilgrimage. Its position at the junction of these two waterways, and latterly its development as a railway centre, has made it an important collecting centre, but it has no manufactures of note of its own. It is the centre of Government of the United Provinces.

*Muttra*, on the Jumna, near the head of the Agra Canal, is an important religious centre.

*Farrukhabad*, on the Ganges, is an interesting example of a river port whose former importance has disappeared since the railways became the great arteries of trade.

*Cawnpore*, on the Ganges, is one of the largest cities in the region. It is a great railway centre, an important manufacturing town and the chief collecting centre for the agricultural products of the whole region.

<sup>1</sup> See note on page 293.

*Meerut* and *Moradabad* are growing centres in the richest parts of the region, and with them may be linked *Bareilly*, *Aligarh*, *Rampur* and *Shahjahanpur*. *Agra*, celebrated as the location of the world-famous *Taj Mahal*, a wonderful tomb erected by one of the Mogul Emperors in memory of his wife, has also modern factory industries.

### THE MIDDLE GANGES PLAIN

This natural region comprises nearly the whole of *Bihar* lying north of the *Ganges*, as well as portions of *Shahabad*, *Patna*, *Gaya* and other districts lying immediately to the south of the river, together with that part of the *United Provinces* lying east of *Allahabad* and north of the *Ganges*. The region is intermediate in character between the dry Upper *Ganges* Plain and the very wet Delta region of *Bengal*. The rainfall varies from 40 inches in the west to just over 70 inches in the northern part of the *Purnea* District. The climate is less extreme

NOT AVAILABLE 12%	WASTE 13%	1 9%	CULTIVATED 2 66%
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FIG. 146.—The classification of the land in the Middle *Ganges* Plain.

Again the absence of forests should be noted.

than in the Upper *Ganges* Plain or the *Punjab*, but it is still cold enough in *January* (average of 61° F.) for fires to be used in houses of European residents. In the hot season the scorching winds blowing down the *Ganges* Valley are still felt, but the heat is less intense than in the *Punjab* or the Upper *Ganges*. Except in the narrow strip south of the *Ganges*, where the climate is drier and the *Son* and other streams are used for irrigation, the irrigation works are protective measures against years of poor rainfall rather than indispensable necessities. Most of the region is an extensive plain watered by tributaries flowing down from the *Himalayas*. All the streams bring down quantities of mud and silt and have built up for themselves banks which are higher than the surrounding land, whilst the deposit of silt in the bed itself raises the water-level above that of the plains on either side. Consequently the rivers frequently overflow and cause widespread floods in the rainy season. Shallow lakes and marshes scattered over the surface of the

region represent old deserted courses of such rivers or low-lying areas between them. As far as possible, however, the marshes have been drained and the land cultivated, with the result that no less than 75 per cent. of the whole area is under crops.

**Agriculture.** Fig. 147 demonstrates the intermediate character of the crops. Rice has now become more important than wheat and barley, and it is interesting to note that the change in relative importance actually takes places along the 40-inch isohyet. Millet, the staple grain in so many of the drier

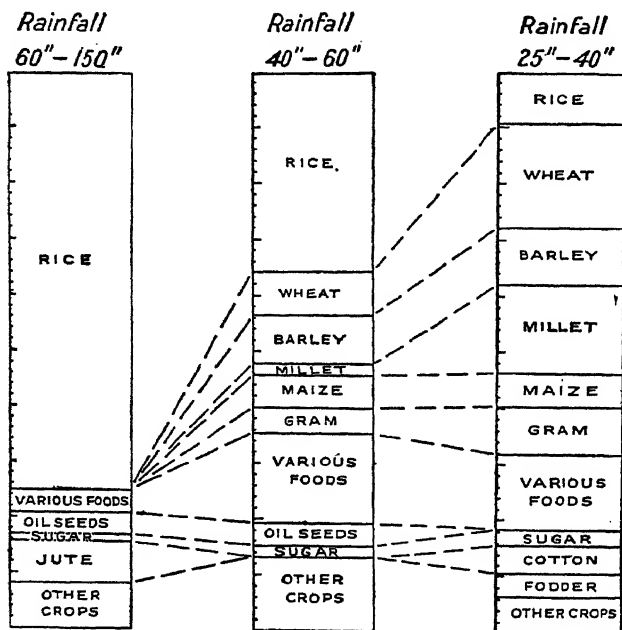


FIG. 147.—The crops of the Ganges Valley—the three main natural regions compared.

This diagram illustrates extremely well the remarkable influence of rainfall on the crops of India.

parts of India, has almost completely disappeared; cotton is of very little importance, but a considerable area is sown with oil-seeds—linseed, rape or mustard and sesamum. This natural region used to be the principal indigo-growing area of India, but the vegetable dye industry has been almost killed by the use of coal-tar dyes. This was also one of the great opium-growing regions.

**Population.** The inhabitants of the greater part of this natural region—that is, of Bihar—are the Biharis. On the



whole, they are men of slow thoughts but long memories, vigorous and disciplined', and are thus somewhat different from their neighbours, the quicker but less vigorous Bengalis. Like the Bengalis, the Biharis live in the midst of their fields rather than in villages like the people of the Upper Ganges Plain and the Punjab. The population is dense and the pressure on the land so severe that there is a large annual emigration. Many of the Biharis go every year in the cold season to work in the mills of Bengal or the docks of Calcutta, returning to their homes after four or five months in time to cultivate their land during the rains. Others go to the tea gardens of Assam, and many afterwards settle permanently in Assam.

Again, there are few large towns in this predominantly agricultural region. Again, there are the famous old towns such as Benares and Monghyr and more modernized towns such as Patna.

In the United Provinces, on the banks of the Ganges, lies *Benares*, the largest town in the region. Benares is an ancient as well as a modern centre of Hindu culture and a very sacred place of pilgrimage. The railway bridge across the Ganges is the first above Sara in Bengal. *Gorakhpur* is now a great collecting centre and railway junction for the north-eastern part of the United Provinces and contrasts with the now neglected river ports of *Mirzapur* and *Fyzabad*. In the Province of Bihar and Orissa, *Patna* is the provincial capital and an important collecting centre for agricultural produce. The town has given its name to 'Patna Rice', a very fine type well known in Europe. Patna stretches for a long distance along the south bank of the Ganges and is connected directly with Calcutta (Howrah) by the East Indian Railway. *Bhagalpur* and the famous old town of *Monghyr* also lie to the south of the Ganges; *Darbhanga* and *Muzaffarpur*—the latter the centre of the now dying indigo industry—are collecting centres north of the river. *Chapra*, situated at the junction of the Gogra and Ganges Rivers, used for that reason to be an important river port with numerous factories, but is now decreasing in size.

#### THE LOWER GANGES VALLEY OR THE DELTAS REGION

This natural region corresponds very closely with the present Presidency of Bengal, as constituted since 1912. It consists almost entirely of a vast alluvial plain—the deltas of those mighty rivers, the Ganges and Brahmaputra. In the north, Bengal includes a small strip of Terai country (known in Bengal as the Duars) and the District of Darjeeling lies in the Himalayan Region. In the east, the Lushai Hills, Chittagong Hill Tracts and the small State of Hill Tippera belong to the Eastern

Hills Region ; in the west, the country near the coalfields may be considered as belonging to the slopes of the Chota Nagpur Plateau. But by far the greater part of Bengal belongs to the Deltas Region, which also includes the Sylhet District or Surma Valley of Assam.

The heavy rainfall makes this region very different from the Upper and Middle Ganges Plain ; instead of being dry and brown in the hot season, the country-side is always green. The climate is equable when compared with the Middle or Upper parts of the Ganges Plain. Everywhere the rainfall is sufficient for the growth of a rich and luxuriant vegetation and for the cultivation of paddy. The rainfall increases from west to east. Calcutta has 60 inches, Dacca 73 and Sylhet 160.

The region falls naturally into three sub-regions:

(a) *The Ganges-Brahmaputra Doab or North Bengal.* This area stretches from the Terai country on the north to the Ganges River on the south. To the north-east is the narrow Brahmaputra or Assam Valley, to the west is the broad Ganges Valley. It is watered by streams flowing down from the Himalaya Mountains. They are torrents in the wet season and frequently change their courses as the Tista has done, but in the dry season are almost dry. The usual flat surface is broken near the centre by a stretch of low hills, called the Barind, covered with brushwood jungle—the remains of a former forest.

(b) *The Old Delta or Central and Western Bengal.* Owing to several causes the great delta of the Ganges and Brahmaputra has moved gradually from west to east. Central Bengal is a land of 'dead and dying rivers'. The waters of the Ganges, with their load of fertile silt, no longer pass through the numerous channels. The place of flowing waters is taken by large swamps or 'bhils', many of which have been drained and form valuable rice land. Near the sea are the Sundarbans—extensive swamp forests which furnish useful timber, and especially firewood, to the towns further inland. In Central Bengal the country is not, as a rule, more than 50 feet above sea-level, but to the west of the Hooghly River, in the country drained by streams such as the Damodar, from the Chota Nagpur Plateau, the land gradually rises, the soil becomes hard and poor and covered with scrub jungle. It is in this extreme western part of the delta that the great coalfields—Raniganj, Asansol and Jherria—are found.

(c) *The New Delta and the Surma Valley.* Here the great rivers are still actively building up their deltas, and every year huge quantities of silt are brought down by the Ganges and Brahmaputra. In the high-water season a great part of the

area is flooded and a rich deposit of silt spread over the country. It is a typical delta region, covered by a network of rivers, streams and creeks. Boats take the place of carts, there are few roads and few railways. In the rains only the river banks and the artificial mounds on which stand the houses appear above the water. It is impossible to go from one village to the next, or even from one house to another, without a boat or a

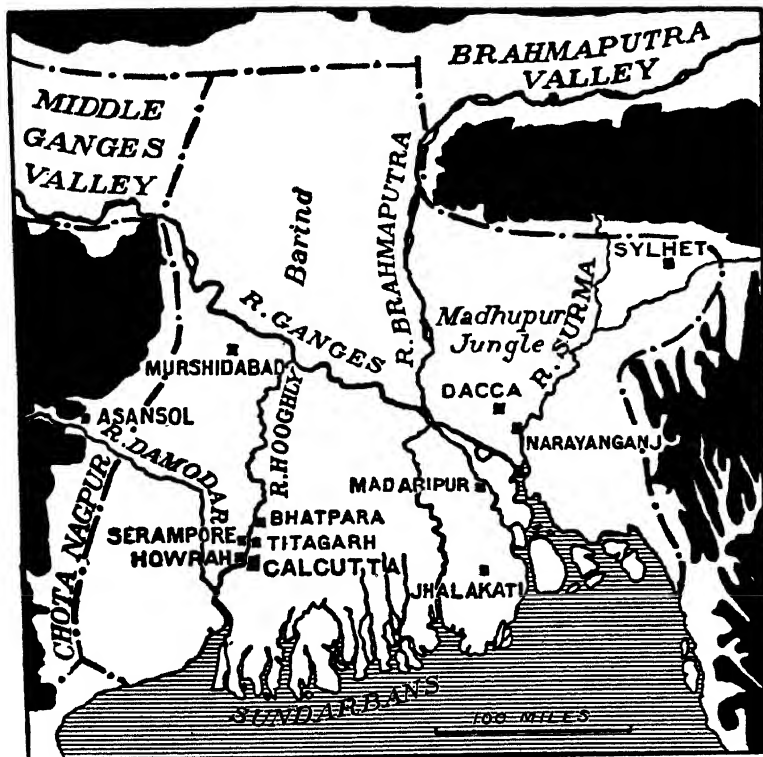


FIG. 148.—The Delta Region.

All land over 500 feet shown in black.

raft or something which will float. Yet it is a fertile region, producing enormous quantities of rice and jute, as well as, curiously enough, a healthy region inhabited by a dense population. In the north-east is a small area of low hills—having an average height of only 40 feet above sea-level—but still important enough to prevent the river Ganges from changing its channel to even further east. This region is called the Madhupur Jungle and is still covered with grass or forest.

**Agriculture.** There is a somewhat larger percentage of waste land and land 'not available' for cultivation in the deltas than in the Middle or Upper Ganges Plains. This is due to the large area still occupied by swamps, as well as to the waste lands of the Barind, Madhupur Jungle and Western Bengal. The 'forests', which cover 6 per cent. of the region, are the Sundarbans—found in the Districts of Backergunge, 24-Parganas and Khulna. Even with these excisions well over half the region is cultivated. Rice is by far the most important crop—it occupies practically three-quarters of the whole cultivated area. The dry-zone crops of the Upper and Middle Ganges have disappeared; the area occupied by wheat, barley, millet and maize is so small that it cannot be shown separately on Fig. 147. A very important new crop appears—jute. Another crop is the oil-seed crop.

**Population.** There is a marked uniformity of population in this natural region. The inhabitants are nearly all Bengalis,

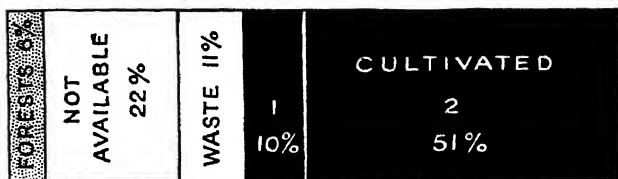


FIG. 149.—The classification of the land in the Ganges Delta Region.

The forests are the Sundarbans. The high proportion of land not available is due to the presence of waterways, marshes, etc.

and 95 per cent. speak Bengali as their native language. But the Bengalis are divided into two well-marked groups by their religion—about half are Mahommedans and slightly less than half Hindus. Agriculture occupies 75 out of every hundred, industry 8 and trade 5. Although this region includes the great city of Calcutta and the jute mill towns, 93 per cent. of the population can be classed as rural. In this region there are scarcely any villages, properly speaking, but isolated farms scattered over the fields. In the New Delta it is necessary first to construct an artificial mound on which the huts can be built above the level of floods.

There are only six towns with over 50,000 inhabitants, but in this region the distinction between the old towns of the past and the modern industrial towns is still more marked. Some of the former are getting smaller—Murshidabad decreased 1911-21 but grew 1921-31—and they act merely as 'market towns' for the districts. Nearly all the largest towns belong

to the second class and have grown up within recent years around rice- or jute-mills.

*Calcutta* (1,196,734 in 1931, including Howrah, 1,485,582) is the largest city, and, although having only one-sixth the population of Greater London, ranks next to the metropolis in the British Empire. It was the capital of India until 1912, when the Government moved to Delhi, but Calcutta still forms the 'Commercial Capital' of India. A little more than a hundred years ago the site of Calcutta was an unhealthy swamp; it has been made into the largest and one of the healthiest cities

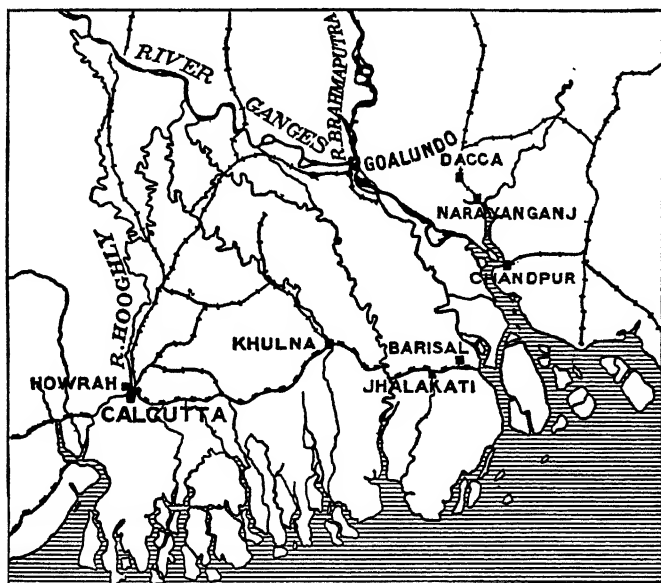


FIG. 150.—The waterways of the Delta, showing in particular the Calcutta and Eastern Canal by which much of the jute is brought to the mill towns of the Hooghly. The map also shows the limitations upon railways enforced by the character of the delta.

of India by the labours of man and the activities of the British Government in India. Although over 70 miles from the sea up the river Hooghly, its wharves are accessible to the largest ocean steamers plying in Indian waters. Dangerous as it is to small craft, the bore which rushes up the river at high tide helps to keep the waterway clear. Very little, if any, water from the Ganges now flows through the Hooghly, but Calcutta has water communication with the east and north of the delta. The Calcutta and Eastern Canal plays an important part in this respect and enables raw jute to be sent cheaply to Calcutta's

mills. The Hooghly is the westernmost of the important delta channels, consequently railways from the west have no extensive waterways to cross. Hence it is Howrah, on the opposite side of the Hooghly, that is the terminus of railways from Delhi, Bombay and Madras. Howrah was connected with Calcutta across the Hooghly by the famous 'bridge of boats' of which the central boats could be removed, now replaced by a new bridge.

*Dacca* (138,513 in 1931) is the second largest city in the Deltas Region (if Howrah is considered a part of Calcutta). It is the centre for the rich agricultural regions of Eastern Bengal or the New Delta. Unlike Calcutta, Dacca is an old capital of Bengal and was an important city 300 years ago.

Outside Calcutta and Dacca there are really no big cities or towns. Amongst the largest of the jute-mill or rice-mill towns are *Bhatpara*, *Titagarh* and *Serampore*, all on the Hooghly above Calcutta. *Narayanganj* and *Madaripur* are examples of collecting and distributing centres which act as clearing-houses for the jute and rice. *Jhalakati* is one of the important towns of Eastern Bengal and the centre of the betel-nut trade. *Sylhet*, the chief town of the fertile Surma Valley of Assam, has only 21,000 people. In the western mining region, on the borders of the Chota Nagpur Plateau and outside the Delta proper, *Asansol* and *Raniganj* are the chief centres.

### THE BRAHMAPUTRA OR ASSAM VALLEY

The Assam Valley, occupied by the middle course of the Brahmaputra, is very different from the broad alluvial plain of the Ganges. The valley, from its western end where it merges into the plains of Bengal to the eastern end where it is close round by mountains, is about 500 miles long, but has an average breadth of only about 50 miles. The river itself is broad, it divides and reunites again many times. On either side there is often a waste marshy belt, but a little distance from the river the flat alluvial lands are given over to rice-growing. Palm trees and villages are dotted about amongst the paddy fields further away from the river are found the gentle slopes covered with tea gardens.

Most of the Assam Valley has a rainfall of over 80 inches but the centre, lying in the lee of the Garo, Khasi and Jaintia Hills, is somewhat drier. Although colder in winter than the Deltas, owing to its more northerly position, cloudy skies tend to temper the heat of the hot season. Winter fogs are common.

**Population.** The population density is only about 150 to the square mile, compared with 500 and over in the Deltas and

Ganges Plains and there is a marked tendency for the population to be concentrated at the western end of the valley, in the Districts of Goalpara and Kamrup which adjoin Bengal. The comparative sparsity of population accounts for the large proportion of waste land—48 per cent., or roughly half the whole. Every year, however, large numbers of Bengalis come from the more crowded parts of Eastern Bengal and settle in Assam, and

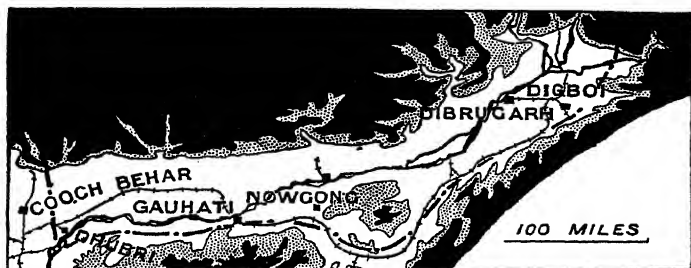


FIG. 151.—The Brahmaputra or Assam Valley.

Land over 1,000 feet, dotted ; over 3,000 feet, black.

Nepalis come from the Himalayas and find in the Assam Valley more fertile land than in the mountains. There are large numbers of Biharis employed as coolies in the tea gardens, and every year numbers of them settle on the land, their place in the tea gardens being taken by fresh arrivals from Bihar. The population of the Assam Valley is thus rapidly increasing and the

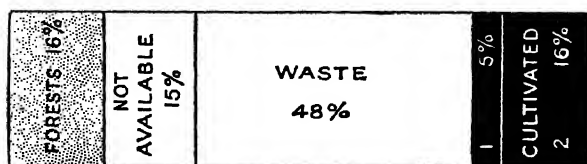


FIG. 152.—The classification of the land in the Brahmaputra Valley

The very large area of land awaiting development is noteworthy.

waste land being brought under cultivation. Only 22 per cent. of the inhabitants of the Province of Assam now speak Assamese, the language of the natives of the province. Formerly large areas were considered unhealthy, but medical science has done much to make possible the spread of settlement. Rice, entirely for home consumption, is the chief crop ; tea and oil-seeds rank next. The distribution of tea has already been considered ;

the increasing tendency for the tea gardens to spread from the hill-sides to the flat lands of the valley, which are equally suitable provided the drainage is good, should be noted. Jute is important in the west. At the eastern end of the Assam Valley, on the borders of the hills, are two small oilfields, including the field at Digboi. There is a small coalfield near by also. The Brahmaputra River is used by country boats for the greater part of its length and interrupts railway communication. The western end of the valley is connected through Bengal with Calcutta by a branch of the Eastern Bengal Railway, whilst running along the eastern part of the valley, south of the river, is the Assam Bengal Railway. But the two lines are separated by the river at Gauhati. From Gauhati to Shillong there is a good motor road; from Dimapur a cart-road runs into Manipur State.

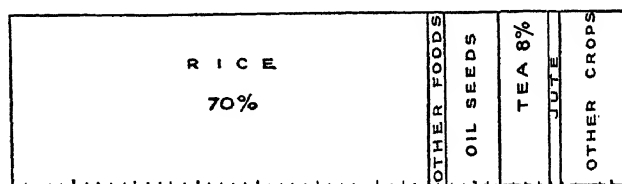


FIG. 153.—The crops of the Brahmaputra Valley.

### CUTCH, KATHIAWAR AND GUJARAT

Strictly speaking, Cutch, Kathiawar and Gujarat do not constitute a natural region. They form together rather a transition belt between the desert on the north, or the very dry valley of Sind, and the very wet West coast on the south. On the whole the region is a lowland one, less than 1,000 feet above sea-level, but there are numerous small hills. It lies on the seaward side of the Rajput uplands and the northern extension of the Western Ghats. It is simplest to consider the whole area as divided into five parts—Cutch, Kathiawar, Northern, Central and Southern Gujarat.

*Cutch* is bounded on three sides by the great marshy useless tract known as the Rann of Cutch, and on the remaining side by the sea. It is for the most part a barren, rocky, treeless and almost useless country and might be counted as part of the Thar Desert which lies to the north.

*Kathiawar* is a large peninsula suffering from a precarious rainfall. In the centre is a group of forest-covered hills—the Gir Forest—famous as the haunt of the only lions found in India and among which most of the rivers have their source. The forests yield some good timber. A large part of the remainder



of Kathiawar is a barren land of very little use. Over large areas the bare rocks are exposed at the surface, and are not covered by any soil; between the rocky ridges are barren, sandy valleys. Here and there are a few more favoured spots, almost like oases in the desert. The people and their villages are concentrated in these richer areas, such as around Damnagar, or in the cotton-growing tracts near Dhari. Wherever irrigation is possible in Kathiawar, wheat becomes an important crop. Porbandar Stone, a limestone much used for building in Bombay, is quarried

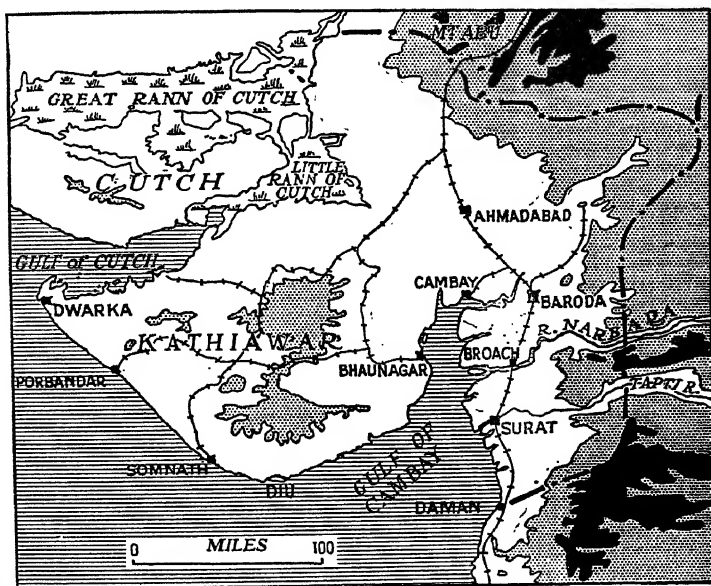


FIG. 154.—Cutch, Kathiawar and Gujarat.

Land over 500 feet, dotted; over 2,000 feet, black.

In recent years there has been a remarkable expansion in trade of the small Kathiawar ports—especially Bhaunagar which has a deep-water port.

along the coast. There are also salt deposits along the coast and lime may become a source of wealth. Politically Kathiawar consists of a large number of small native States. The principal towns are the capitals of the States.

*Northern Gujarat* is still a dry region and may, on the whole, be described as a flat region with a poor sandy soil. It may be remarked that the greater part of Gujarat lies in Bombay Presidency, but includes the several scattered areas which form the rich and progressive Native State of Baroda. Wherever the soil is richer in Northern Gujarat the population is dense and much

millet is grown ; the poorer, sandy parts are inhabited by primitive peoples such as the Kolis, who in times past used to plunder their richer neighbours. Irrigation is not very important, since few of the streams flow all the year, but cultivation is protected by tanks.

*Central Gujarat* is wetter, and the 40-inch isohyet intersect it. Rice can be grown on the low-lying stretches of alluvium bordering the rivers, but millet and cotton are more important. The black cotton soil is found in the south. The eastern part is more hilly and largely covered with scrub. The climate of this part of Gujarat is healthy and the population is denser than further south.

*Southern Gujarat* is the wettest part of the region and adjoins the West Coast Region on the south. Along the coast the climate is equable and healthy ; there one finds a narrow strip where the soil is salt and poor and the water brackish ; behind this is a broad strip of rich black soil very suitable for rice and the best kinds of Indian cotton, sugar-cane and many other crops. Here the land is thickly populated, the people rich and flourishing. Farther inland hills appear, covered with forest and thick jungle. In these inland parts the soil is poorer, cotton and rice of indifferent quality are the most important crops. The eastern parts of Southern Gujarat are still wilder ; more than half is covered with dense unhealthy forests inhabited by primitive tribes, and the whole is only thinly peopled. There is thus a remarkable change as one goes inland from the coast.

**Towns of Gujarat.** Running through Gujarat from south to north is the main line of the Bombay, Baroda and Central Indian Railway. The chief towns of the region—Daman, Surat, Broach, Baroda and Ahmadabad—lie along this line. From north of Ahmadabad a branch runs into Kathiawar.

*Daman*, in Southern Gujarat, is a Portuguese possession, as is Diu on the south coast of Kathiawar.

*Surat* (117,434 in 1921, but only 99,000 in 1931) is a town in Southern Gujarat, near the mouth of the Tapti River, but it has now nothing like its old importance. Before the rise of Bombay it was the leading town of the West Coast, and the first factory of the East India Company. Its former importance is symbolized in the use of the name 'Surat' (like that of its neighbour, Broach) for a certain quality of Indian raw cotton.

*Baroda* (112,862 in 1931) is the capital of the important State of Baroda, has modern cotton-mills and is a large railway junction.

*Cambay* and other towns round the Gulf of Cambay are less important than formerly. The great cotton-mills of towns such as Bombay have replaced the small local industries and there

is no longer an export trade from the small seaports of the fast-shallowing Gulf. Instead all the trade is through the great port of Bombay.

*Ahmadabad* (313,789 in 1931) is the great collecting centre of Northern Gujarat and stands high among the important cities of India. It has modern mills and is also a railway junction of note.

### THE WEST COAST (NORTH)

The West Coast Region is the narrow strip between the crest of the Western Ghats or Sahyadri Mountains—that is, the edge of the plateau—and the Arabian Sea. The strip of plain between the mountains and the sea is very narrow, much narrower than in the north, in the Gujarat Region already considered, near the Nerbada and Tapti Rivers. The northern part of the West Coast may be considered as extending as far south as the Portuguese territory of Goa and lies wholly in Bombay Presidency. Except north of Bombay the rainfall is everywhere over 80 inches, but the dry season is slightly longer than in the southern part of the West Coast and the annual range of temperature, though only  $10^{\circ}$  at Bombay, slightly greater.

The numerous short, swift streams which flow down from the Ghats have each formed their alluvial fans, whilst the waves which beat against the shore during the period of the south-west monsoon have piled up sand-dunes along the coast. In the northern part of the West Coast, however,

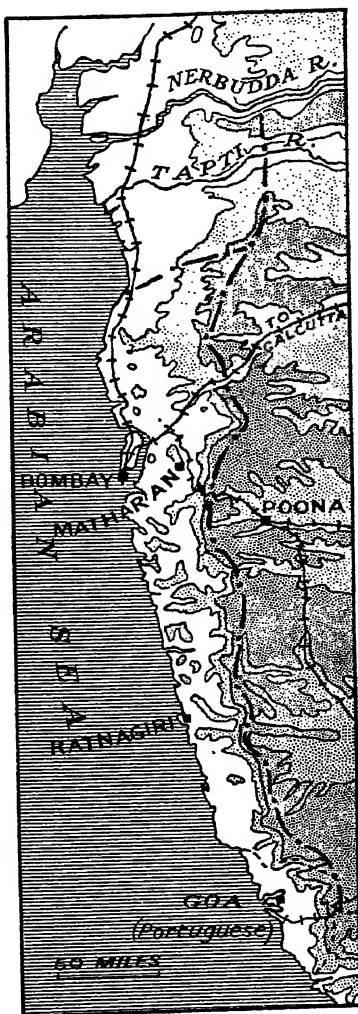


FIG. 155.—The West Coast Region (North).

For explanation of shading used, see Fig. 160. The heavy line indicates the approximate limits of the natural region, coinciding with the crest of the Western Ghats. The numerous hills along the coast south of Bombay suggest a contrast with the southern part of the west coast. In this map the old spelling of Nerbada has been used.

spurs from the hills reach the coast and the strip of alluvium is not continuous. Although the coastal strip is so narrow—only 30 or 40 miles wide—three parallel strips may be distinguished:

- (a) The steep slopes of the Western Ghats.
- (b) The flat alluvial land.
- (c) The sand-dunes along the coast.

*The steep slopes of the Western Ghats*—here composed of Deccan lavas—and the smaller foothills are usually clothed with luxuriant tropical forest or monsoon forest in which teak is important. Some of the forests are evergreen, for the climate is always hot and steamy and the species of trees are numerous. One of the most important, however, is teak, and the working of the teak is an

FORESTS	NOT AVAILABLE	WASTE	CULTIVATED	
23%	.16%	15%	13%	33%

FIG. 156.—The classification of the land in the West Coast Region (North and South).

RICE	RAGI	OTHER FOODS	COCONUTS	FODDER	VEGETABLES	OTHER CROPS
50%		10%	6%			

FIG. 157.—The crops of the West Coast Region.

important industry from Bombay to Travancore. The teak flourishes where the rainfall is not too heavy rather than in the wettest parts. The many short rivers on the West Coast are of little use in navigation, but can be used for floating logs. The rivers near Bombay have been harnessed and supply electric power to the Bombay cotton mills. From about latitude  $21^{\circ}$  southwards, the Ghats present an almost uninterrupted face except for the two gaps which have done much to determine the rise to importance of Bombay.

*The flat alluvial land* forms the most important part of the West Coast region. The water of the small streams from the hills is prevented from reaching the sea by the sand-dunes and frequently spreads out to form shallow lagoons, though these are not so marked as in the southern part of the West Coast.

The banks of the lagoons are often lined with coconut plantations ; here lie the numerous villages, and every possible piece of land is sown with paddy, interrupted at intervals by groves of areca nuts. In this part of India each hut in the villages has its own garden with coconut or areca (betel) nut trees and the separate huts may be some distance apart.

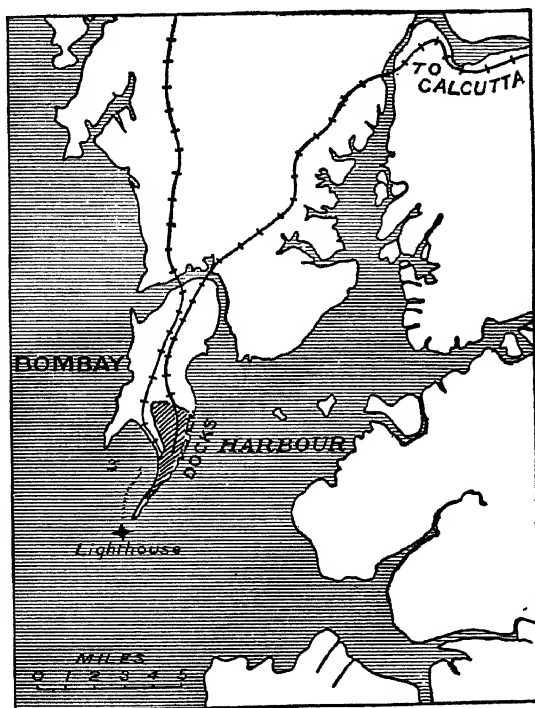


FIG. 158.—The position of Bombay.

This sketch-map demonstrates the magnificent harbour but emphasizes the restricted area of the island on which Bombay is built and the consequent difficulty in expansion. 'Back Bay', which is being partly reclaimed to provide more land, is the bay west of the city and north of the lighthouse.

*The coast* itself is largely covered with groves of coconut palms. At intervals there are marshy tracts with mangrove swamps.

**Agriculture.** Figs. 156 and 157 have been drawn for the whole of the West Coast, including both the northern and southern portions. The first, however, serves to show the considerable area, nearly a quarter, which is forested and also the large pro-

portion occupied by marshes, swamps, lagoons, etc., and so 'not available'. Rice is by far the most important food crop and occupies about half the cropped area. The importance of coconuts is worthy of special note.

**Population.** The region is densely populated; the average density is over 200 to the square mile and hence actually much higher on the cultivable tracts. The language of the region is Marathi and it is interesting to note that the lascars who man the Eastern Merchant Service and whose ancestors were the Maratha pirates, are from this West Coast. The only town of any size or importance is Bombay. The absence of other centres is explained by the difficulties not only of communication with the interior, but also along the coast itself. So real is the latter difficulty that to this day there is no railway running along the West Coast. Openings suitable for harbours are few—in fact, scarcely exist between Bombay and Marmagao and, in the absence of communication with the interior, any port would have but a very small hinterland.

*Bombay* (1,161,383 in 1931) is the second city of India and vies with Calcutta for supremacy as a port. Bombay owes its eminence to several factors. There is, first, its magnificent natural harbour; second, its command of two gates through the Ghats; third, its position on that side of India which faces Europe; and, fourth, the richness of its hinterland, including as it does the great cotton lands of the Bombay Deccan. There are other factors which have proved favourable to its rise: the suitability of the climate for cotton spinning and weaving; the presence of water-power resources in the Ghats near by. Like New York, Bombay is built on an island and has begun to feel the difficulty of expansion on its island site.

#### THE WEST COAST (SOUTH)

This region is broadly similar to the northern part already described. With the exception of the N. Kanara District of Bombay in the north, it lies wholly in the Madras Presidency and the important native State of Travancore. The tract has long been recognized as a region distinct from the remainder of India under the name of the 'Malabar Coast'. Climatically the dry season is shorter and the annual range of temperature (for example, 5° at Trivandrum) less than in the northern part of the West Coast. The difference may seem slight, but is sufficient to affect vegetation—the planting of rubber is restricted to the south. The whole region tends to be broader and is divisible, still more distinctly, into three strips:

- (a) The slopes of the Western Ghats are covered with dense evergreen forests, and forests cover nearly a quarter of the whole region. The Ghats here consist of Archean rocks.



FIG. 159.—Political map of Southern India.

For an explanation of the tints used, see Fig. 127.

- (b) The flat alluvial land behind the sand-dunes, where the water of the streams from the hills is prevented from reaching the sea and so spreads out to form shallow

lagoons. The lagoons have been connected by canals and it is possible to travel for hundreds of miles—

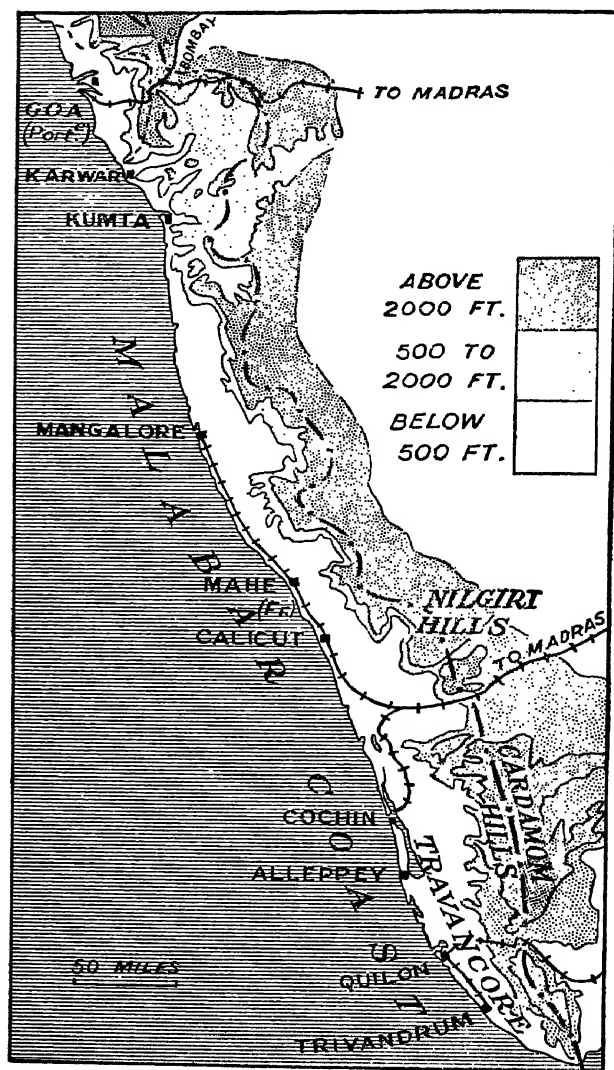


FIG. 160.—The West Coast Region (South).

The heavy line indicates the approximate limits of the natural region.

almost the entire length of the region—by these waterways. This delightful region is only too little known even to the seasoned resident of India. Many of the



lagoons open to the sea and are deep enough to form harbours for native craft. One, the harbour of Cochin, is being dredged to form a modern ocean port. The banks of the lagoons are often lined with coconut plantations, whilst every suitable piece of land is planted with paddy. Here and there are groves of the areca-nut palm, and the pepper plant, for which this coast has so long been famous, is still grown, together with other condiments and spices such as cardamom.

- (c) The sand-dunes along the coast, largely covered by coconut plantations.

**Population.** The region is densely populated, and in Travancore the density actually reaches over 1,200 to the square mile. The staple food is, of course, rice, but many of the rice cultivators are backward jungle tribes. The coconut palm is of great importance to the inhabitants. Their huts are thatched with its leaves, and the wood is used for building and for firewood. The preparation of the fibre of the husks or 'coir-picking' is an important industry and so is the drying of the kernel for export as copra. Coconut oil is also obtained from the latter, whilst the milk of the nut is made into a potent liquor. Rubber-planting has become a noteworthy industry in Travancore. Fishing is a common occupation along the coast.

The Western Ghats really terminate in the Nilgiri Hills, which are separated by the Palghat Gap, as shown in Fig. 161, from the Cardamom Hills. The railway between Madras and the West Coast takes advantage of this gap, and it should be noted that one branch runs north along the coast to Mangalore and one south to Cochin. The line from Madras to Quilon and Trivandrum takes advantage of a gap further south in the Cardamom Hills. By virtue of these railway communications it is really correct to say that the West Coast lies in the hinterland of the port of Madras. When Cochin harbour is complete the reverse will apply and much, at least, of the land east of the Palghat Gap will be within the normal hinterland of Cochin.

*Calicut* is the fourth largest town in Madras Presidency, and has a small timber trade. Like Cochin, it was once a famous spice port. *Trivandrum* is the chief town of Travancore; *Alleppey* and *Quilon*, also in Travancore, are growing industrial centres, where coir rope and matting are made.

#### THE CARNATIC REGION OR TAMIL REGION

Either of these designations seems preferable to East Coast South, since the region now to be considered embraces all the land between the plateau and the Bay of Bengal—much of which

cannot be described as coastal. This is the region of India where Tamil is the predominant language, hence the name 'Tamil Region'.

Near the sea there is a broad stretch of flat land—a coastal plain—but inland small hills appear and the western part of the

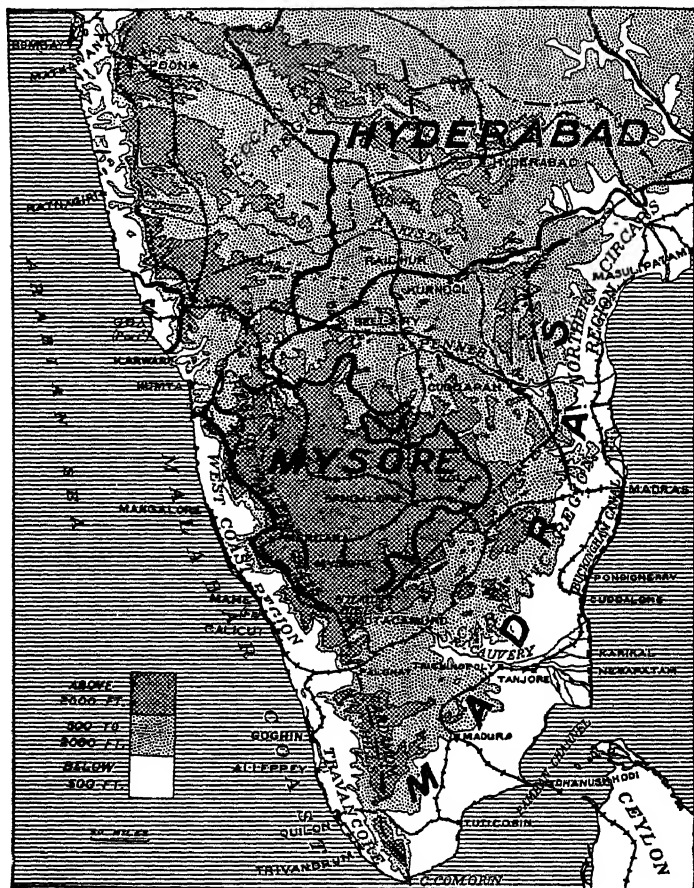


FIG. 161.—Southern India.

The heavy lines are the provincial or native state boundaries ; the broken lines the boundaries between natural regions.

region is quite hilly. The Carnatic Region falls therefore into two parts :

- (a) The coastal plain of South India.
- (b) The hilly western parts.

The whole region is bounded on the west by the crest of the

Cardamom Hills and on the north-west extends to the slopes of the plateau. The coastal plain consists mainly of alluvium.

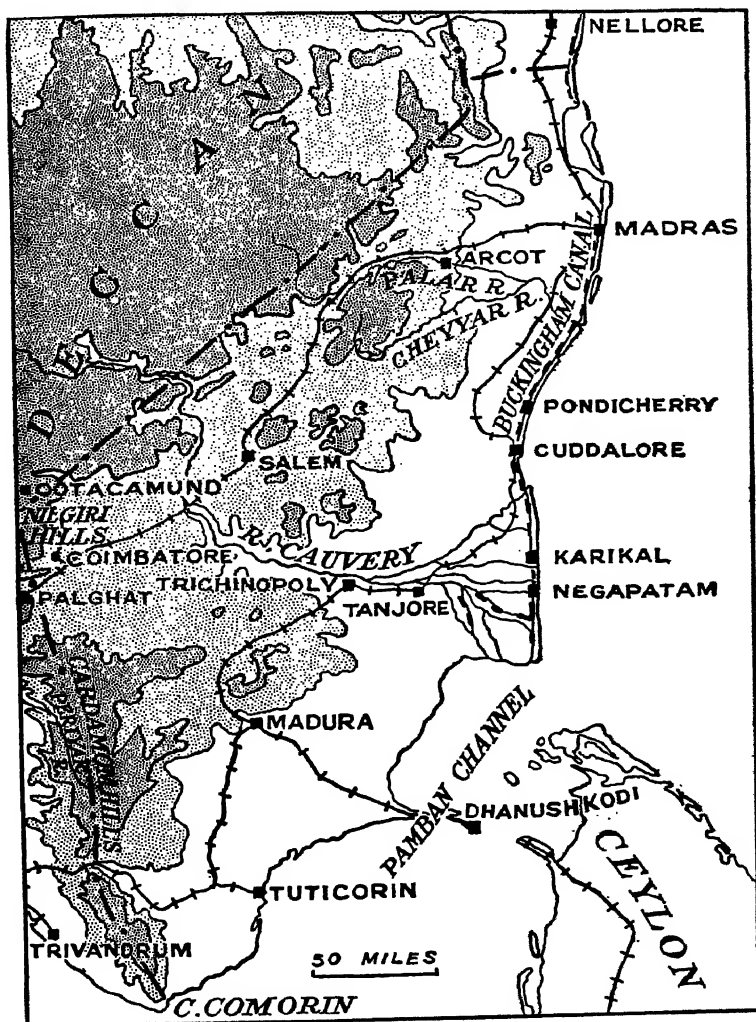


FIG. 162.—The Carnatic or Tamil Region.

Land above 2,000 feet, dark dots; land between 500 and 2,000 feet, light dots. The heavy line indicates the approximate limits of the natural region as a whole and the map at once suggests its two-fold division.

together with certain younger sedimentary rocks; the hills are of ancient crystalline rocks like those of the plateau.

Climatically the region is quite distinct from the remainder of India. During the period of the south-west monsoon the area lies in the lee of the Cardamom Hills and the plateau, so that during India's normal rainy season from May to September no part receives more than 20 inches of rain. In October, during the change of the monsoons, severe storms occur along the Madras coast and heavy rain falls, with the result that October is a very wet month over much of the region. In November and December similar storms bring rain (compare Figs. 87, 88), and the coastal plain is wetter than the hilly regions to the west. The two parts differ somewhat climatically :

(a) The coastal plain has a rainfall of just over or just under 40 inches a year, falling mainly in October, November and December.

(b) The hilly western parts have less than 40 inches a year and the régime is nearer the normal.

The cloudless skies which prevail from January to June result in high temperatures, and the East Coast has, therefore, a bigger annual range than the West Coast, but less than the plateau (compare Madras,  $14^{\circ}$  ; Nagpur,  $27^{\circ}$ ).

**Irrigation.** Nearly two-thirds of the coastal plain are cultivated and the percentage of forests and waste land is small in each case. Of the hilly western parts forests occupy a quarter and nearly half is cultivated, whilst the percentage of waste ground is again small. The percentage of cultivated land in each case is high when one remembers that the rainfall over a large part of the region is less than 40 inches and the soils in the interior are often indifferent. In good or normal rainfall years the land is easily able to support the dense population, but the rainfall is apt to vary within wide limits. Despite the many thousands of irrigation tanks (see Fig. 91A) this has been one of the great famine areas of India. The famine menace still exists, but has been largely overcome by improvements in communication, whereby foodstuffs can be rushed from other parts of India into the stricken area. Modern canal irrigation works have done much to mitigate the danger of famine. Amongst the more important works may be noted :

(a) The Periyar Project. The Periyar River rises in the Cardamom Hills and flows westward through Travancore to the Arabian Sea. It flows, therefore, through a well-watered region where its water is not required for irrigation. The valley was therefore dammed and a tunnel made through the hills and the water diverted to the dry eastern side of the hills. There it is conducted by canals and waters thousands of acres in the neighbourhood of Madura.

(b) The Poini, Palar and Cheyyar Systems. South of the town of Arcot, these three rivers have been dammed and their waters irrigate a large tract of country west of Madras.

(c) The Cauvery Delta System. One of the oldest irrigation works in India is the large system of canals which now covers the whole of the delta of the Cauvery River. The system was reconstructed by the British nearly a hundred years ago and greatly improved by the Mettur Dam—the largest in the Empire—opened in 1934. 1,300,000 acres are now irrigated; there are 1,500 miles of main and branch canals and 2,000 miles of distributaries.

**Agriculture.** There is, not unnaturally, a considerable difference between the crops grown on the coastal tracts and those grown amongst the hills. On the coastal plain rice is the chief crop and is mostly grown on irrigated land, millet on land which is not irrigated. In the hills where flat land suitable for irrigation is scarcer and rainfall is less, millet replaces rice as the chief crop. Taking the region as a whole, about equal quantities of rice and millet are grown and both together form the staple foodstuffs. The contrast with the West Coast is interesting and, by comparison with Northern India, the absence of wheat is noteworthy—the warmer winter is unsuited to the varieties of wheat at present cultivated. Some years ago, during a severe famine in Madras, supplies of wheat were rushed into the stricken area from the north. Yet such is variation in custom consequent upon the vastness of India and such the inherent conservatism of the ignorant masses that thousands died of starvation in sight of the untouched wagons of wheat. The poor, light dry soils of many parts of the region favour the growth of ground-nuts. On the hilly lands the short-stapled Indian cotton is grown, but on the irrigated land it is possible to grow American upland. Sugar-cane and tobacco are cultivated over most of the area. All along the coast itself on the sandy dunes are coconut plantations. On the slopes of the Nilgiri Hills—that is, really on the slopes of the edge of the plateau—there are important tea gardens. On the dry hill pastures of this region sheep are more numerous than in any other part of India.

The forests, which are shown in Fig. 164 as occupying a very considerable area, grow on the hill-slopes wherever there is sufficient moisture. The most important trees are teak (especially in Coimbatore and on the slopes of the Nilgiri Hills) and sandalwood. Timber trees are planted in many parts of the region.

The minerals of the region are not very important, but mica is mined in the Nellore District and much salt is obtained from the sea along the coast.

Important industries, also along the coast, are fishing and pearl-fishing.

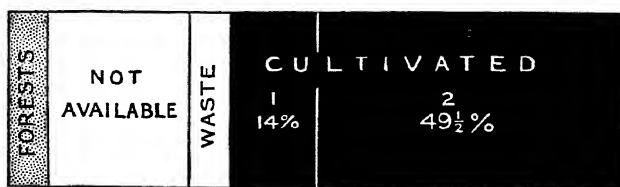


FIG. 163.—The classification of the land in the coastal parts of the Carnatic Region.

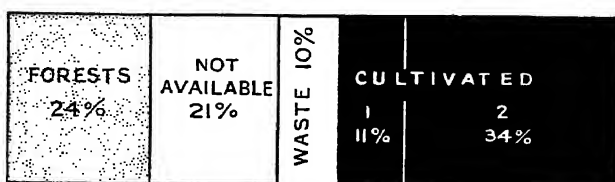


FIG. 164.—The classification of the land in the hilly western parts of the Carnatic Region.

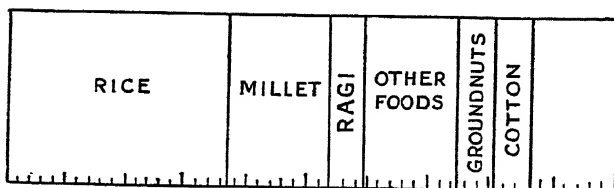


FIG. 165.—The crops of the coastal parts of the Carnatic Region—where there is much flat land available for rice, and water for irrigation is obtained from the rivers, so that rice covers 37 per cent. of the cropped area.

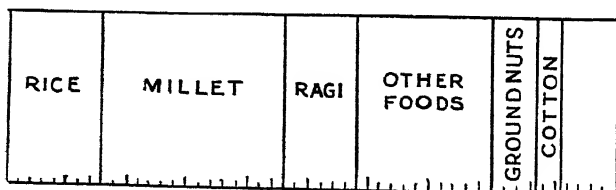


FIG. 166.—The crops of the hilly western parts of the Carnatic Region—where far less flat, irrigable land is available for rice, and millets (including ragi) cover 42 per cent. of the cropped area.

**Population.** The population over the region as a whole is dense—over 400 people to the square mile. In the District of Tanjore it actually reaches 1,644. The region corresponds

closely with the area in which the Tamil language is spoken, and the people are nearly all Dravidians, if one excepts the hill tribes such as live in the Nilgiris.

*Madras* (647,230 in 1931) is the third largest city in India and, in value of trade, the fifth and last of the great ports. Madras has not the same extent of rich hinterland as Bombay, Calcutta and Karachi, which share the trade of the huge Hindustan Plain. On the east coast of India there are no natural inlets which are suitable for harbours, yet there are many small ports along the coast. At nearly all of them—except Madras—steamers have to anchor some distance off shore and land goods and passengers in small boats or 'mussoola'. The landing is often dangerous, owing to the line of surf, and in the past there has been much loss of life and damage to merchandise. Madras is the only port which has a modern artificial harbour, built at great cost and only finished in 1909. The principal export is leather, and the tanning of hides and skins is an important local industry. There are also numbers of cotton mills in Madras and both cotton goods and raw cotton are exported. Madras is well served by railways, the principal of which have already been noticed. Running north and south through Madras is the Buckingham Navigation Canal, a salt-water canal nearly 250 miles long, which obviates a passage for small craft along the stormy coast.

*Tuticorin* is also a cotton centre and famous for the produce of the pearl fisheries in the shallow Gulf of Mannar. It is the port for the southern part of the region and has a regular service of steamers to Colombo. The mail route between India and Ceylon is, however, via Dhanushkodi and Talaimannar, where the intervening 22 miles is very shallow and it has been proposed to build a causeway. Owing to the shallowness of the sea there is very little steamer traffic through the Palk Strait between India and Ceylon; it nearly all passes round the island. *Cuddalore* and *Negapatam* are other small ports; *Trichinopoly*, *Tanjore*, *Tinnevely* and *Madura* the chief inland centres. Madura has a dyeing industry and lies in the heart of rich irrigated land. *Pondicherry*, the chief town of the scattered French possessions in India, lies on the coast south of Madras.

#### THE NORTHERN CIRCARS REGION AND ORISSA

This region, which may also be called East Coast North, is a narrow coastal strip lying between the Eastern Ghats and the Bay of Bengal. It comprises five districts of Madras Presidency (from north to south, Ganjam, Vizagapatam, Godavari, Kistna and Guntur) and Orissa in the Province of Bihar and

Orissa. The region corresponds roughly with the old kingdom of Kalinga.

Structurally it is not a coastal plain. Towards the south the deltas of the Godavari and Kistna rivers occupy a large area ; further north there is a coastal plain interrupted by many small hills—consisting of the same ancient rocks as the plateau—some of which reach the sea coast. In the north is the delta of the Mahanadi River, including the large shallow Chilka Lake—an arm of the sea, which has been cut off by the growth of the

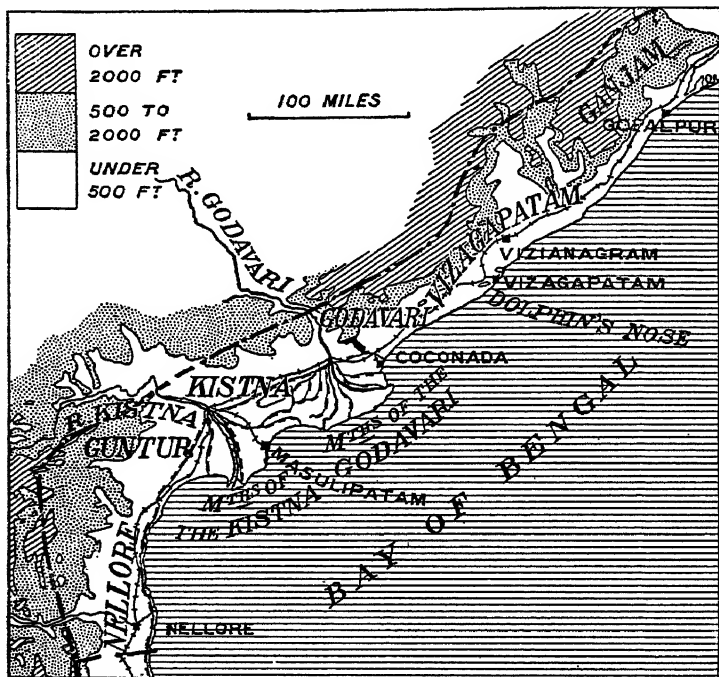


FIG. 167.—The Northern Circars Region. Nellore is more correctly regarded as lying in the Carnatic Region.

delta. Throughout the region there is a marked contrast between the level tracts of alluvium and younger sedimentary rocks which afford a fertile soil and the small hills or inselbergs of old crystalline rocks which afford but a poor soil and on which but little will grow. Amongst the minerals obtained from the old rocks may be noted the manganese ore near Vizagapatam. Along the shore there is usually a sandy strip and at times wind-blown sand does considerable damage to the agricultural tracts inland. Mangrove swamps occur around the deltas and salt impregnation



may ruin the soil of considerable tracts. The winning of salt is important in Orissa. The slopes of the Eastern Ghats, which bound the region on the west, are usually forested, and the sal is an important tree.

Climatically the region becomes progressively drier from Orissa southwards until Nellore is reached, where there is a

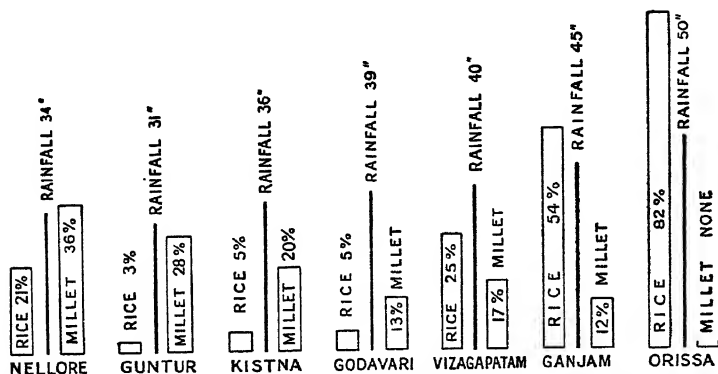


FIG. 168.—The crops of the Northern Circars Region showing the variation in the relative importance of rice and millet according to rainfall. Irrigated crops are not included.

slight increase. The 40-inch isohyet passes through the District of Vizagapatam. In contrast with the Carnatic Region, however, the rainfall régime is that of the greater part of India. It should

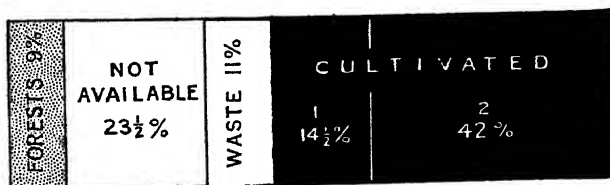


FIG. 169.—The classification of the land in the Northern Circars Region.

1 = current fallows; 2 = area sown.

be noted that the south-west monsoon blows parallel to the coast of the region, otherwise the rainfall would be much heavier.

**Agriculture.** This region affords a fascinating example of the climatic control of crops in India. The importance of the 40-inch isohyet has already been emphasized as forming the dividing line between 'Dry Zone' and 'Wet Zone' crops. In Orissa, with an average rainfall of 50 inches, rice occupies 82

per cent. of the cropped area, whereas millet is practically absent. In Ganjam, with an average fall of 45 inches, rice occupies 54 per cent. and millet 12 per cent. Going southwards along the coast there is, as shown in Fig. 168, a progressive diminution of rainfall, accompanied by a diminution in rice acreage and an increase in millet acreage. In Guntur, with a rainfall of 31 inches, millet occupies nine times the area of rice on the non-irrigated area. In the irrigated areas of the Kistna and Godavari deltas large quantities of rice are grown. Spices form an important crop in this region.

**Population.** Although nearly a quarter of the area—rugged hillocks affording pasture to sheep, mangrove swamps, etc.—cannot be cultivated, whilst forests and waste land cover a fifth of the whole, this region is thickly populated, having an average density of 385. Telugu is the language over most of the area. There is through communication in this area between Calcutta on the one hand and Madras on the other, but it is a feature of special importance that only a single railway cuts through the ramparts of the Eastern Ghats. Consequently the small ports along the coast—Cocanada, Masulipatam, Calingapatam and Gopalpur—have but very limited hinterlands. A railway has been constructed between Raipur in the Central Provinces and Vizagapatam. The latter town was already one of the best ports along a coast of indifferent harbours, being partly sheltered by a headland known as the Dolphin's Nose. A modern harbour was finished in 1933, and *Vizagapatam* will thus become the main outlet for a large and important tract of the north-eastern part of the plateau.

*Vizianagram* is the only inland town of note in the Northern Circars. In Orissa there is a canal running to the Hooghly River near Calcutta and on it lies the once important port of Balasore, where formerly English, Dutch and French factories existed. *Cuttack* is the old capital of the kings of Orissa. The most important town in Orissa is now Puri, pleasantly situated on the sea coast and a famous place of pilgrimage.

### THE SOUTHERN DECCAN OR DECCAN PROPER

Although the term Deccan is often applied to the whole of Peninsular India south of the Satpura line, it is more properly restricted to the southern and south-eastern parts of the plateau. Thus delineated the Deccan embraces the whole of Mysore, the Deccan Districts of Madras (Bellary, Kurnool, Anantapur, Cuddapah and part of Chittoor), the eastern half of Hyderabad, and the Dharwar District of Bombay. As shown in Fig. 170

practically the whole is more than 500 feet above sea-level and the greater part of the south over 2,000 feet. The lower ground is occupied by the broad valleys of the Kistna and its tributaries and that of the Penner. The greatest heights are reached on the



FIG. 170.—The Southern Deccan or Deccan proper.

Land over 2,000 feet, dark dots ; land, 500 to 2,000 feet, light dots. The heavy lines show the approximate limits of natural regions.

southern borders. Here, separated by a deep trough from the Deccan proper, is the lofty little massif of undulating grassland, the home of the Kota and Toda tribes, known as the Nilgiri Hills, where one dome reaches 8,760 feet. The rolling plains

of the plateau itself are broken by granitic or gneissose masses that rise abruptly and form dome-shaped hills and boulder covered inselbergs.

Climatically the region lies in the 'rain-shadow' area on its own western edge—the Western Ghats; and, except for a strip along the Ghats themselves, the rainfall is less than 40 inches. In some parts the annual fall actually drops below 20 inches. Further, the rainfall is irregular from year to year

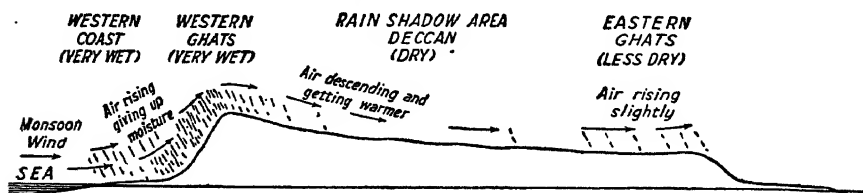


FIG. 171.—Section across the Deccan Plateau, illustrating rainfall conditions.

and famine is a severe menace. The reddish soils are suitable for irrigation and cultivation is protected by tanks, but in bad years the tanks remain unfilled even in the height of the rainy season. The temperatures are naturally more extreme than on the coasts and elevation results in temperatures below 50° on the hills in winter.

Manganese ore, iron ore and chromite are mined in small quantities, but the gold of Kolar in Mysore is the chief mineral

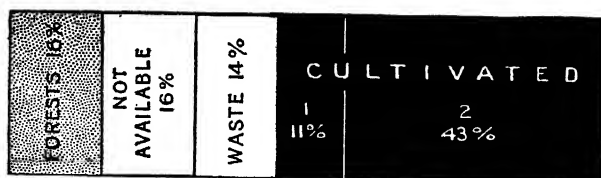


FIG. 172.—Classification of land in the Southern Deccan. A large proportion of the forested land is found in the damper, western part of the region on the slopes of the Ghats.

product. In recent years (1926–33) the Kolar Goldfield has produced annually between 330,000 and 380,000 ounces of fine gold valued at about 2 crores of rupees (£1,500,000). A little gold is also found in Hyderabad.

**Agriculture.** Forests cover 16 per cent. of the surface of the Deccan, a rather surprisingly large percentage for a rather dry region. The forests are concentrated, however, in the west of the region—on the slopes of the Western Ghats—and on the

damper slopes of hills in other parts, where aspect is an important factor. In Mysore the largely forest-clad western half of the State is called the malnad; the drier, flatter, eastern half the maidan. Broadly speaking, the old crystalline rocks yield but a poor soil (generally reddish in colour and hence contrasting with the north-western Deccan), so that, although more than half the region is cultivated, the yield of the individual crops is but poor. Over most of the region there is insufficient rainfall and a scarcity of suitable flat land for the cultivation of rice. Most of the rice cultivation is, therefore, concentrated on the level surface of the plateau in parts of Mysore and in the irrigated valley lands of the Kurnool and Cuddapah Districts of Madras. Fig. 173 shows that a small area—2 per cent. of the cropped surface—is occupied by wheat. Nearly all this wheat is grown in the Dharwar District of Bombay, which is distinct in several respects from other parts of the Deccan. Nearly everywhere, as in all the drier, hilly regions of India, millet is the staple food

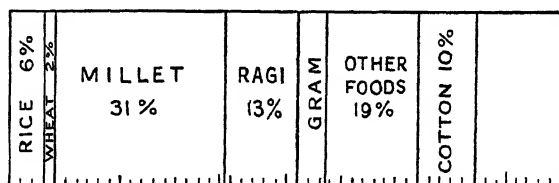


FIG. 173.—The crops of the Deccan Plateau (Southern Deccan).

For explanation, see the text.

of the people and the most important crop. Cotton is another noteworthy crop, but it does not occupy the dominant position that it does in the Bombay Deccan.

Coffee-planting was formerly an important industry in Mysore, but it has never fully recovered from a disease which wiped out many plantations and from the subsequent glut in the world's markets caused by the enormous Brazilian production. Tea gardens are important on the well-drained slopes of the Nilgiri Hills.

Sheep flourish on the dry grasslands of the hill-sides (compare the Carnatic Region), and the Deccan has nearly a quarter of all the sheep of India. Cattle are numerous and in the drier parts large quantities of fodder are grown for their food.

**Population.** When compared with the coastal tracts and the great northern plains, the Deccan is not thickly populated. In Hyderabad there are only about 175 people to the square mile, in Mysore 224 and in the Madras Deccan about 150. In

the south-west of the region—that is, in Mysore—nearly all the people speak Kanarese (or Kannada); in the remainder of the region Telugu is the principal language. It is for this reason that the eastern half of Hyderabad, which falls in the Deccan Region is called Telingana, or the land of the Telugu language. Hinduism is the dominant religion.

*Mysore* (107,142 in 1931) is the capital of the State of Mysore and the principal palace of the Maharajah is there, but *Bangalore* (306,470 in 1931), which is a larger city and nearer the centre of the State, is the seat of government. Both Mysore and Bangalore have silk factories. High up in the Nilgiri Hills, in the Presidency of Madras, is the hill station of Ootacamund—the familiar Ooty to which the Madras Government migrates in the hot weather—reached by a hill railway from the plain below.

*Bellary* is the largest town in the Deccan Districts of Madras Presidency. *Kurnool* stands at the head of a canal, the Kurnool-Cuddapah Canal, which irrigates a valley between the Kistna and Penner Rivers. This canal formed a small part of an enormous scheme to irrigate much of the drier part of Madras, but was the only part to be finished and resulted in an expenditure of five times the estimated cost. The authorities were deceived by the wonderful success of irrigation in the northern plains and failed to realise the entirely different conditions, not only in the water available, but in the nature of the soil, which was such that it was in places ruined rather than improved by irrigation. The lesson this canal taught is one worthy of remembrance.

*Hyderabad* (466,894 in 1931), the fourth largest city in India and the capital of the great State of Hyderabad, lies in the north-east of this region.

### THE DECCAN LAVAS REGION

More than one name exists for this natural region. The term Deccan Trap Region should at least be dropped, since the term 'trap' is a relic of the days when geologists lacked sufficient faith to endorse their opinions by calling an ancient lava a lava. Perhaps a better term would be the Black Cotton Soil Region, since it is the area covered by the cotton soil which matters, and not the area of the Deccan Lavas—not always exactly the same. The term Bombay Deccan may be used, since the region concerned lies essentially in the hinterland of Bombay, though it far oversteps the bounds of Bombay Presidency. Much may be said for the simple name the North-Western Deccan. Roughly, then, the area now under consideration is the area covered by the well-known black cotton soil,

as far north as the Satpura line and westwards to the crest of the Ghats. So defined it embraces the whole of Bombay Presidency which lies on the plateau (except the southernmost district of Dharwar); the western half of the Central Provinces (with Berar) and the western half of Hyderabad.

The North-Western Deccan is a land of bare, undulating plains from which rise flat-topped ranges of hills, conspicuously terraced owing to the sheets of lava of which they are composed.

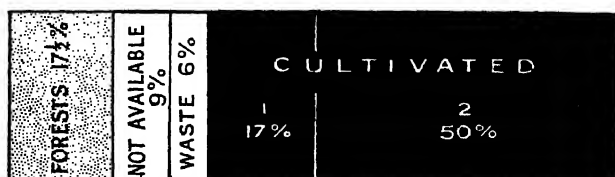


FIG. 174.—Classification of the land in the Deccan Lavas Region.

Special interest attaches to the small proportion of waste land and the high percentage of cultivated land—67 per cent., including 17 per cent. of fallows—compared with the other plateau regions.

The scenery is thus at once contrasted with that of the Southern Deccan. The soils are generally dark in colour and thus contrast with the usually reddish soils of the south; they are retentive of moisture and suitable for crops not requiring irrigation. Thus, although the climate, including rainfall, is roughly comparable with that of the Southern Deccan, there is a relative absence of tanks. The land is lower than further south; con-

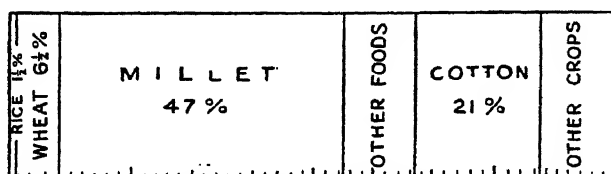


FIG. 175.—The crops of the Deccan Lavas Region (Bombay Deccan).

This diagram illustrates extraordinarily well that the black cotton soil does not lend itself to irrigation and the cultivation of rice. The acreage devoted to non-food crops is exceptionally high.

siderable and important areas, such as the broad valley of the Purna in Berar and the upper part of the Tapti and of the Wardha in the Central Provinces, lie below or but slightly above the 1,000-foot contour. The tableland proper really rises south of these high plains of Berar and Nagpur, and the Ajanta Range lies on its threshold.

**Agriculture.** The apparently large percentage of forest in this predominantly unforested region is explained by the extensive

tracts along the western margins—that is, on the slopes of the Western Ghats and the damper hill-slopes elsewhere. The remarkably low percentage of waste land is worthy of comment no less than two-thirds of the whole region are cultivated. With a low rainfall and a soil unsuitable for irrigation rice is of very little importance. Conditions favour the growth of millets and the chief food crops, especially the Great Millet. The spread of wheat from the north is important. A great contrast between this region and the Southern Deccan is not immediately apparent from a comparison of Figs. 175 and 173. In the North-Western Deccan commercial or cash crops, mainly cotton and oil-seeds grown for export or sale, are the outstanding feature of the rural economy; in the Southern Deccan food crops for home consumption are of predominant importance.<sup>1</sup> The region at present under consideration is, of course, the cotton producing region of India *par excellence*, though the cotton is almost entirely native Indian. The high plains of Berar form the foci of cultivation—well situated for supplying the Bombay mills.

**Population.** Although such a large proportion of the North-Western Deccan is cultivated, the average density of population is low—about 160. The region is the home of the sturdy Marathas, and Marathi is the predominant language, hence the name Marathwara for the western half of Hyderabad which lies within this region. Although the eastern and western halves of Hyderabad are, as has been shown, very distinct there is little difference in density of population. This is the result of rich black soil unsuitable for irrigation plus low rainfall on the west, balancing poorer soil suitable for irrigation plus better rainfall on the east. The towns of this region are, in the main, collecting centres. *Sholapur* in Bombay and *Gulbarga* have this function and so, still more markedly, have *Akola* and *Amraoti* in the heart of the cotton lands of Berar. *Poona* (250,187 in 1931) is different; it lies near the crest of the Western Ghats and commands one of the gaps leading to Bombay and has become the hot-weather capital of Bombay Presidency. Special mention will be made later of *Nagpur*, which lies on the eastern borders of the region.

### THE NORTH-EASTERN PLATEAU

The north-eastern part of the plateau is not a single entity in the same way as the Southern or North-Western Deccan. Its plateau character has been more masked by the effects of river

<sup>1</sup> On this and other matters, see E. Simkins, *The Agricultural Geography of the Deccan Plateau of India*, Supplement to *Geography*, No. 2, 1927.



erosion, and there are marked contrasts between the broad river plains of the Mahanadi and Godavari and the wild fastnesses of the Eastern Ghats and the Central Highlands. There are, however, certain features common to the whole :

- (a) Practically the whole is more than 500 feet above sea-level and the line of the Eastern Ghats still forms the

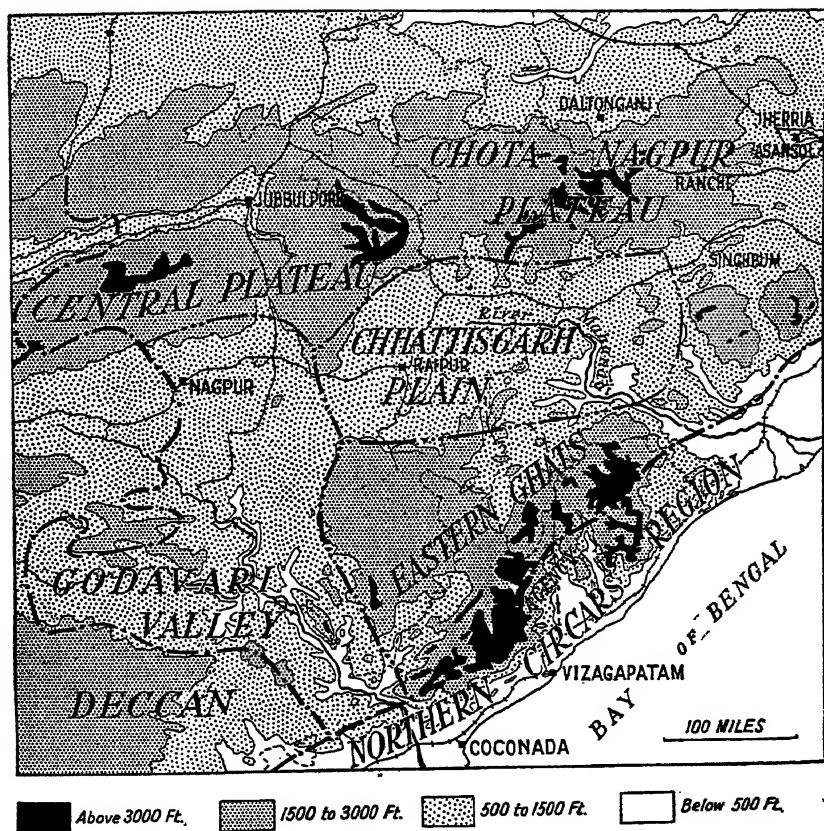


FIG. 176.—The north-eastern part of the Indian Plateau, showing an approximate division into natural regions.

- boundary of the plateau area. Where the rivers pass this boundary there are falls and rapids.
- (b) The basal system of rocks is everywhere the pre-Cambrian complex, though masked in some of the valleys by alluvium and older sediments.
- (c) The rainfall is more than 40 inches and hence greater than in other parts of the plateau.

It is convenient to consider the north-east of the plateau as bounded on the north by the Narbada-Son trough and thus including as its edge the Satpura-Mahadeo-Maikal line of hills (the black patches on the Central Plateau of Fig. 176 are the Mahadeo and Maikal Hills) and the northern rim of the Chota Nagpur Plateau. Five sub-regions may then be distinguished

- (a) The Chota Nagpur Plateau, lying in the Province of Bihar and Orissa.
- (b) The Central Plateau or Central Highlands, embracing the western continuation of the Chota Nagpur Plateau and lying in the Central Provinces.
- (c) The northern part of the Eastern Ghats, perhaps better termed the Bastar-Orissa Highlands, lying on the borders of Madras, Central Provinces and Orissa.
- (d) The Chhattisgarh Plain or Valley-Plain of the Upper Mahanadi.
- (e) The Godavari Valley and the Nagpur high plains, lying mainly in the Central Provinces.



FIG. 177.—The classification of the land in the Chota Nagpur Plateau.

*The Chota Nagpur Plateau* is one of the wildest and least known parts of India and is inhabited by very primitive tribes. A large proportion of the surface is forest covered and the valuable gregarious sal tree is an important constituent of the forests. On the flatter parts of the plateau there are extensive open grassy stretches or areas of scrubland. Many of the river valleys are rocky, but where they are broader paddy can be grown in small fields. The region has been termed, not inappropriately, the 'Wales' of India. The central core has formed the refuge for many of the early inhabitants of India. Peaceful penetration is fast altering the character of the margins: on the eastern margins is the principal coalfield region of India; in other parts are the principal iron ore and mica mines of India: in other parts forests are the source of attraction.

Until very recently, at least, some of the forest tribes used bows and arrows, lived principally on wild animals (including monkeys) and fruits and wore no clothing but a few leaves.

Small of stature, honest and brave, they possess many of the qualities lacking in so-called civilized peoples. The most numerous tribes are the Santals, who have so far been brought into touch with civilization that three out of every hundred perform at least one journey by railway in a year. The collection of lac is an industry of importance amongst the forest-dwellers. Their agriculture is limited to the cultivation of maize, millets, oil-seed and pulses for their own use.

*The Central Plateau* or the *Central Highlands* may be described as generally similar to the Chota Nagpur Plateau, but less extensive. The western portion (Mahadeo Hills) is separated from the

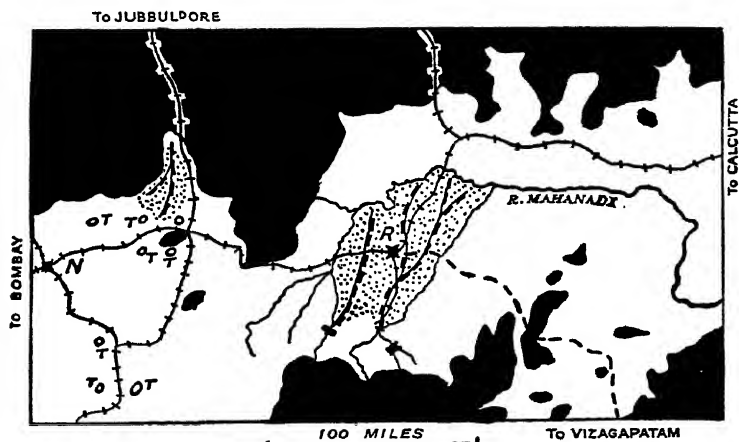


FIG. 178.—The irrigated area of the Chhattisgarh Plain around Raipur (R).

=Nagpur; T=Important tanks. The dotted line shows the direction taken by the new railway direct to Vizagapatam. Land over 1,500 ft., black.

eastern (Maikal Hills) by an important pass, guarded by Jubbulpore in the Narbada Valley to the north.

*The Eastern Ghats* in this part of India, with which may be linked the Bastar Highlands, are divided into two unequal portions by the Mahanadi Valley. The larger southern portion lies largely in the 'Agency Division' of Madras—a division so called because it is not organized into districts, but is administered by Agents. The ordinary law of the land is not enforced and the primitive tribes who inhabit this thickly forested country are left to follow their own customs as far as possible. As yet no railway penetrates this backward part of India. The population is less than 40 to the square mile.

*The Chhattisgarh Plain* lies between the three areas of high- and just described. It is a broad valley-plain drained by the

upper course of the Mahanadi and its tributaries. The natural vegetation of mixed deciduous forest, in which sal was an important tree, has been largely cleared and large areas are given over to rice cultivation. For the latter purpose much land has been irrigated around the natural centre of the region, Raipur. The population averages 150 to the square mile and in some tracts exceeds 300. There is little doubt that this area is one capable of further development and there was good reason for the construction of the line from Raipur to the port of Vizagapatam.

*The Valley of the Godavari* and its tributaries includes the wetter, eastern parts of the Wardha Valley and also the Wairganga Valley-plain. It is physically continuous with the high plains of cotton-growing Berar, but the soil is no longer of the black cotton soil type, the rainfall is heavier (over 40 inches) and rice replaces millet. *Nagpur* (215,165 in 1931) lies to the north-west, almost midway between Bombay and Calcutta and on the borders of two great natural regions—the north-western and north-eastern plateau. It has cotton mills. In the south stretches of the Godavari are navigable for at least part of the year. Where the river cuts through the Ghats by a series of rapids, a tramway has been made.

### THE CENTRAL INDIAN FORELAND

The Central Indian Foreland may be described as a plateau which rises gradually from the Ganges Plain and terminates southwards in an escarpment overlooking the valley of the Son River in the east and the Narbada River in the west. To this escarpment the name Kaimur Range has been applied in the east, Bhanrer Range in the centre and Vindhya Range in the west. The drainage north of the crest of the scarp is entirely to the Ganges, thus the region lies in the Ganges Basin. Although a plateau, it is separated from the Great Deccan Plateau by the Narbada-Son trough, across which it faces the heights of the Mahadeo and Maikal. Thus it is a typical 'foreland' to the great plateau when approaching from the plains of the north. There is no real western limit; the Central Indian Foreland fades into that complex region which has here been called the Rajput Uplands. The Central Indian Foreland lies mainly in the eastern half of that confederation of Native States known as Central India. The chief difference between the eastern half (of which the most typical part is the area known as Bundelkhand) and the Rajput Upland Region is that most of this region has a rainfall of more than 40 inches and the under

lying rocks are ancient crystalline. In the Rajput Uplands wheat, millet and cotton are the staple crops; in this region rice assumes more importance (especially if one includes the Son Valley) and cotton almost disappears. *Jhansi* is the town which commands the principal approach to the Foreland from the Ganges Valley. The position of *Jubbulpore* (124,382 in 1931) at the head of the Narbada Valley is interesting. It commands a gap through the Central Highlands to the south and the natural

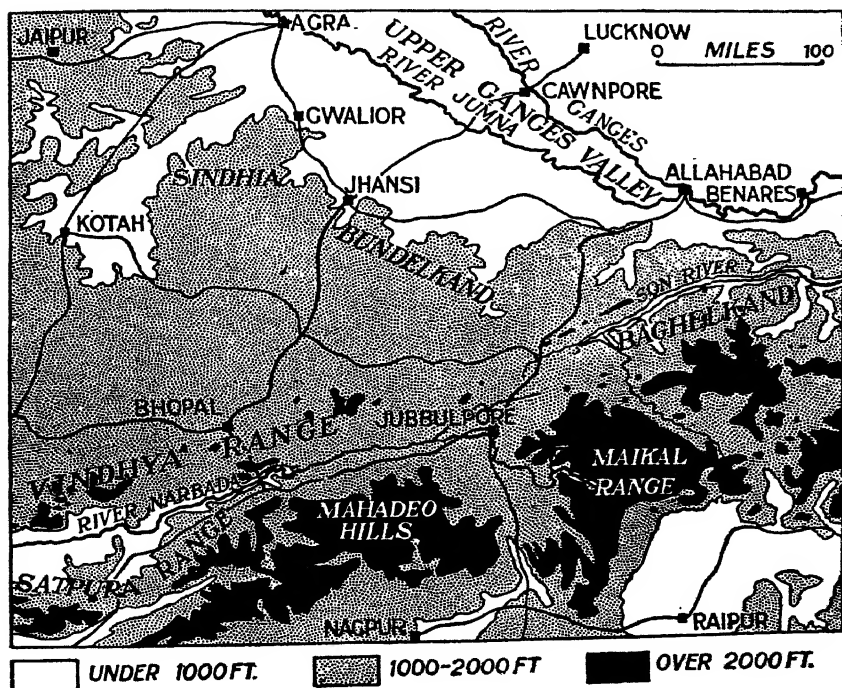


FIG. 179.—The Central Indian Foreland.

route down the Narbada Valley to Bombay on the West and, indeed, the easiest through route from the West Coast to the Ganges Valley. This is the line followed by the mails from Bombay to Calcutta, and *vice versa*, via Jubbulpore and Allahabad; although the distance is greater, the gradients are less severe and the time shorter than straight across the plateau from Bombay to Calcutta via Nagpur. Jubbulpore has important cotton manufactures.

## THE RAJPUT UPLAND REGION

The name Rajput Upland has been chosen to designate this somewhat complex region because it is the home of the Rajput of colourful and legendary fame and because it lies largely in

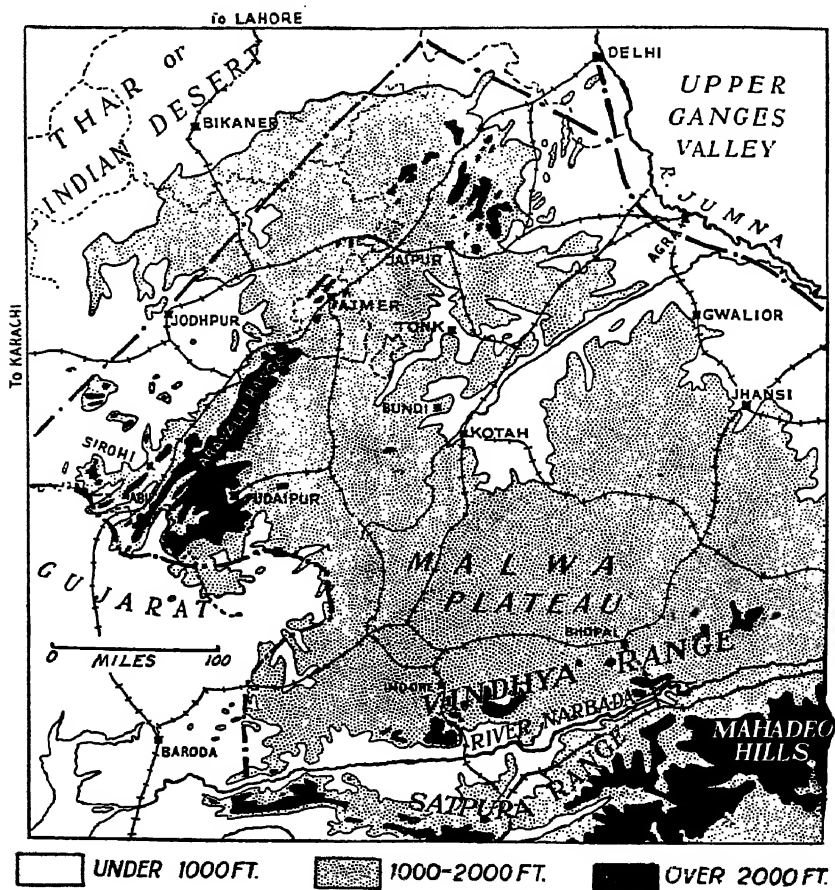


FIG. 180.—The Rajput Uplands.

The approximate limits of this complex natural region are shown on the north, north-west and west by a line of heavy dots and dashes.

the group of Native States now known as Rajputana. It is, on the whole, a plateau sloping towards the Ganges Valley on the north-east and drained by tributaries of the Ganges. It is bounded on the north-west by the Aravalli Range and on the south by the scarp of the plateau which there forms the

Vindhya Range. To the north of the Vindhyas lies a tract of Deccan lava forming the well-known Malwa Plateau; further north and north-west are the old crystalline rocks. For the sake of convenience we will consider with this region the Narbada Valley and the following five units may be distinguished:

- (a) The Aravalli Range and its north-eastern extension.
- (b) The network of forested hills of Southern Rajputana.
- (c) The valleys of Eastern Rajputana.

FORESTS 8%	NOT AVAILABLE	WASTE	CULTIVATED	
	30 %	21 %	1 11 %	2 30 %

FIG. 181.—The classification of the land in the Rajput Upland Region.

The somewhat low percentage of cultivated and the high percentage of waste land when compared with the Deccan Lavas Region to the south reflects the uncertainty of the rainfall.

- (d) The Malwa Plateau built up of Deccan lavas and its southern edge, the Vindhya Range.
- (e) The Narbada Valley.

Climatically the whole region is a dry one, with an average rainfall of less than 40 inches. The rain falls mainly during severe storms and the total amount fluctuates widely from year to year. Irrigation is almost impossible owing to the configura-

WHEAT 11%	BARLEY 8%	MILLET 37 %	MAIZE 3%	GRAM & OTHER FOODS 25%	OIL SEEDS 4%	COTTON 3%	OTHERS
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FIG. 182.—The crops of the Rajput Uplands.

The large proportion devoted to gram, mainly for fodder, should be noted, and the very small percentage of non-food crops.

tion of the surface and crops depend mainly on rainfall. Hence in good years the crop yields may be excellent; in bad years the crops may fail entirely. Fortunately there are two harvests (rabi and kharif), and the failure of one does not necessarily mean the failure of the other.

The sparsity of population which, except in the small British district of Ajmer, is usually below 100, reflects in the main the precarious nature of the rainfall. In good years the region could

support a much larger population. The staple food is millet, with wheat and barley in smaller quantities. Large quantities of gram are grown for fodder. Considerable areas are forested, but the forests are of a dry type, merging into scrubland.

**Population.** In the hilly forested parts of this region live the Bhils, a primitive forest tribe. In other parts of the region the people are mainly Hindus, with Rajasthani as their language. Rajputana is also the great centre of the Jains. It is interesting to notice that an unusually large percentage of the population is engaged in industry. Many native industries still survive, e.g. the making of cotton goods, whilst woollen goods, especially blankets, are made in most parts of Rajputana from the wool of local sheep and goats. In the drier regions camel-hair is used in the manufacture of carpets, blankets, clothes, etc.

Several important routes run through the region. That along the Narbada Valley has already been mentioned; through the heart of the region runs the route from Agra to Bombay; along the northern slopes of the Aravalli Range is the main line from Delhi via Ahmadabad to Bombay.

*Ajmer* (119,524 in 1931), the principal town of the tiny British Province of Ajmer-Merwara, is a flourishing town of over 100,000 inhabitants; increasing in size, it has food and textile industries and railway workshops.

*Jaipur* (144,179 in 1931), though larger than Ajmer, has suffered from plague and other diseases and, despite its textile and railway industries, decreased in size in the decade 1911-21.

*Abu* is a small hill station at the southern end of the Aravalli Range, 5,000 feet above sea-level. As a result of its elevation there is a rainfall of 60 inches, though the near-by plains have but 20.

*Udaipur* is the beautiful capital of the proud State of Mewar. The State occupies a hilly plateau at the southern end of the Aravalli Hills.

### THE THAR OR GREAT INDIAN DESERT

The crest of the Aravalli Range is generally about 3,000 feet high and from there the land slopes north-westwards gently, but irregularly, to the plains of the Indus. The Great Indian Desert occupies this sloping area and thus lies between the Aravalli Range and the alluvial plains of the Indus and the Punjab. The desert lies for the most part in Rajputana, but embraces also the neighbouring parts of the Punjab (especially the large State of Bahawalpur) and Sind.

It consists of a sandy waste, interrupted by rocky hills and waterless valleys. The ground is often entirely bare; in some



places there may be a few shrubs or plants with thick, fleshy leaves and stems which can store up water, or with very long roots which can reach the moisture far below the surface. The rainfall of the desert is generally less than 10 inches annually, and even this amount is very irregular and falls mainly during storms. In some years no rain at all falls. It should be noted, however, that the rainfall is greater than in many parts of the rich Indus Valley. The Thar Desert remains a desert because of the absence of water for irrigation and the absence of level land which could be irrigated.

Naturally the desert is but very thinly populated. The State of Jaisalmer, in the heart of the desert, has only 4 people to the square mile. Some of the people live in villages which spring up wherever there is a little water and some handfuls of millet and fodder can be grown. Frequently the water in the wells fails or becomes salt and the village must needs be abandoned. Camel traders across the desert are numerous, and the little town of Jaisalmer is a centre of camel routes. *Bikanir* is a small town towards the north-east which is noted for its manufacture of camel-hair goods and carpets. It is a flourishing town, increasing in size.

The importance of the desert as a barrier to man's movements has already been noted in reference to the strategic position of Delhi. To this day there is neither road nor railway through the heart of the desert, though the line from Karachi to Delhi goes across the south.<sup>1</sup>

### BURMA<sup>2</sup>

Although Burma was, until 1935, a province of the Indian Empire, it has been reserved for separate treatment for several reasons. Not only is it cut off from India proper by a marked mountain barrier and is geographically a part of Indo-China (hence the usual French name 'Indo-Chine anglaise') but it is also distinct structurally and ethnologically.

The Province of Burma, as constituted since the annexation of Upper Burma in 1886, comprises the British territory of Upper and Lower Burma, the extensive native States known as the Federated Shan States and Karenni—each State administered by its own Sawbwa or Chief—as well as several tracts of unadministered territory in the more remote parts. Lower Burma<sup>3</sup> corresponds to the area acquired by the British Indian Govern-

<sup>1</sup> For particulars of the general character of Sind deserts, see G. de P. Cotter, *Mem. Geol. Survey India*, Vol. XLVII, Part 2.

<sup>2</sup> This section has been based on articles prepared by the writer for the *Encyclopædia Britannica* and the *Encyclopædia Italiana*.

<sup>3</sup> Arakan and Tenasserim (1826) to which was added Pegu (1852).

ment in the two wars of 1826 and 1852, whilst Upper Burma is the former independent Kingdom of Burma, annexed on

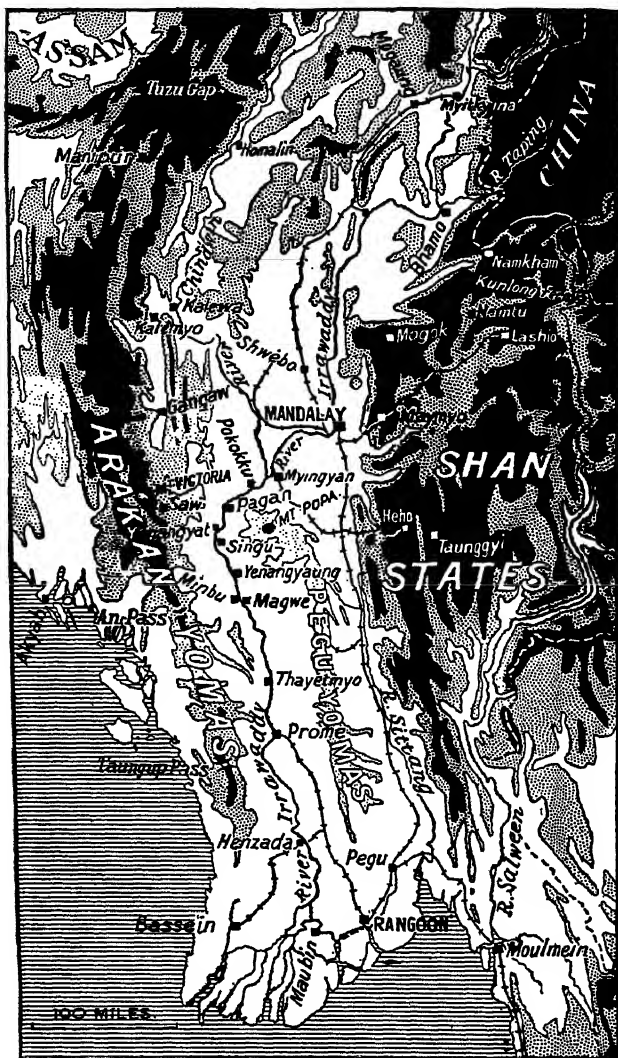


FIG. 183.—General map of the heart of Burma.

Land over 1,000 feet, dotted; land over 3,000 feet, black. The north and south alignment of the physical features and the threefold division of the country are readily apparent.

1st January, 1886. The province stretches from  $9^{\circ} 55'$  to about  $28^{\circ} 30'$  of North Latitude and from Longitude  $92^{\circ} 10'$  to  $101^{\circ} 9'$

east of Greenwich, and has an extreme length from north to south of about 1,200 miles and a breadth in Latitude  $21^{\circ}$  North of 575 miles from east to west. The total area is estimated at 262,732 square miles. Burma proper, inclusive of the Chin Hills and the administered Kachin Hill Tracts, occupies about 184,102 square miles, the Shan States, which comprise the whole of the eastern portion of the province, some 62,305 square miles, and the unadministered territory some 16,325 square miles. Thus the Province of Burma is easily the largest of the provinces of India.

Roughly half of Burma lies outside the Tropics, but the configuration of the country, like that of India proper, is such that the whole may be regarded as a tropical country.

**Structure.** Burma falls naturally into three great geomorphological units :

- (a) The Arakan Yoma, a great series of fold ranges of Alpine age, which forms the barrier between Burma and India. The foothills of the Arakan Yoma stretch as far as the shores of the Bay of Bengal.
- (b) The Shan Plateau massif, occupying the whole of the east of the country and extending southwards into Tenasserim. The massif forms part of what has been called the Indo-Malayan Mountain System and has existed as a geomorphological unit since the close of the Mesozoic.
- (c) The Central Basin, lying between the Arakan Yoma and the Shan Plateau. Formerly a gulf of the early Tertiary Sea, open to the south, it is now occupied by a great spread of Tertiary rocks.

The great mountain range of the Arakan Yoma and its continuation northwards has a core of old crystalline rocks. On either side are hard, tightly-folded, sedimentary rocks, mainly Tertiary in age. A small part of Burma—the Division of Arakan—lies between the Arakan Yoma and the Bay of Bengal. Some of the peaks of the Arakan Yoma rise to over 10,000 feet and the highest is believed to be Mount Victoria. The whole range forms an effective barrier between Burma and India proper. Chromite and other useful minerals are known to occur, especially in association with serpentine intrusions, but are not at present exploited. The western edge of the Shan Plateau massif is well marked, both physically and geologically. It rises abruptly from the valley and for 400 or 500 miles the edge is formed by a long strip of granitic or gneissose rocks. The plateau averages 3,000 feet in height, but its surface has been much dissected and running through the centre from

north to south is the deep trough occupied by the Salween River. Southwards the plateau passes through Karenni into that part of Burma known as Tenasserim and gradually loses its plateau character. The predominant rocks in the Shan Plateau are gneisses—which yield the rubies and other gemstones for which Burma has so long been famous—and a massive limestone

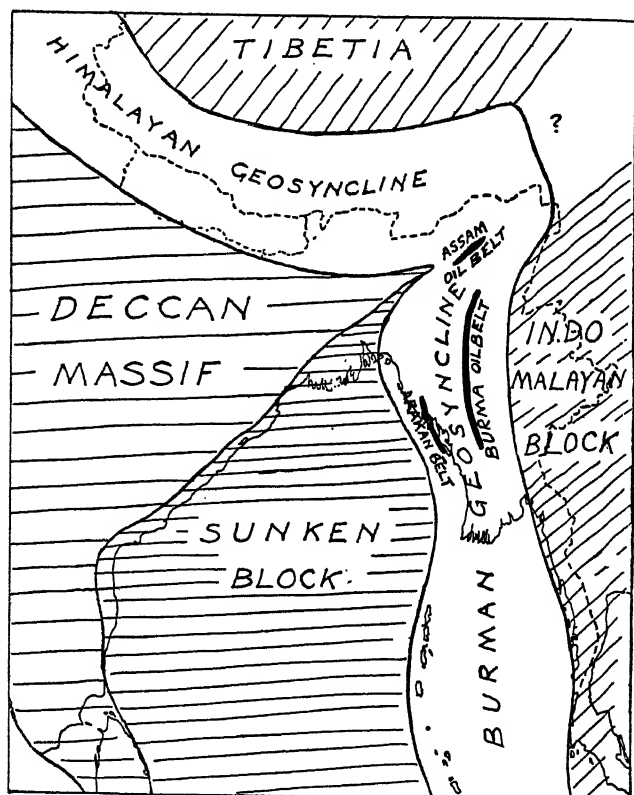


FIG. 184.—The structural units in Eastern India and Burma, showing the relation of the oil belts of Burma and Assam to the geosynclinal areas of early Tertiary times.

of Devono-Carboniferous age. Rocks of all ages from Pre-Cambrian to Jurassic occur in the massif, whilst deposits of late Tertiary and Pleistocene age occupy old lake-basins. In Pre-Cambrian rocks at Mogok occur the principal ruby 'mines'—the workings are open-cast—but the industry is now of minor importance. At Bawdwin, associated with a group of ancient volcanic rocks, are very extensive deposits of silver-lead ore,

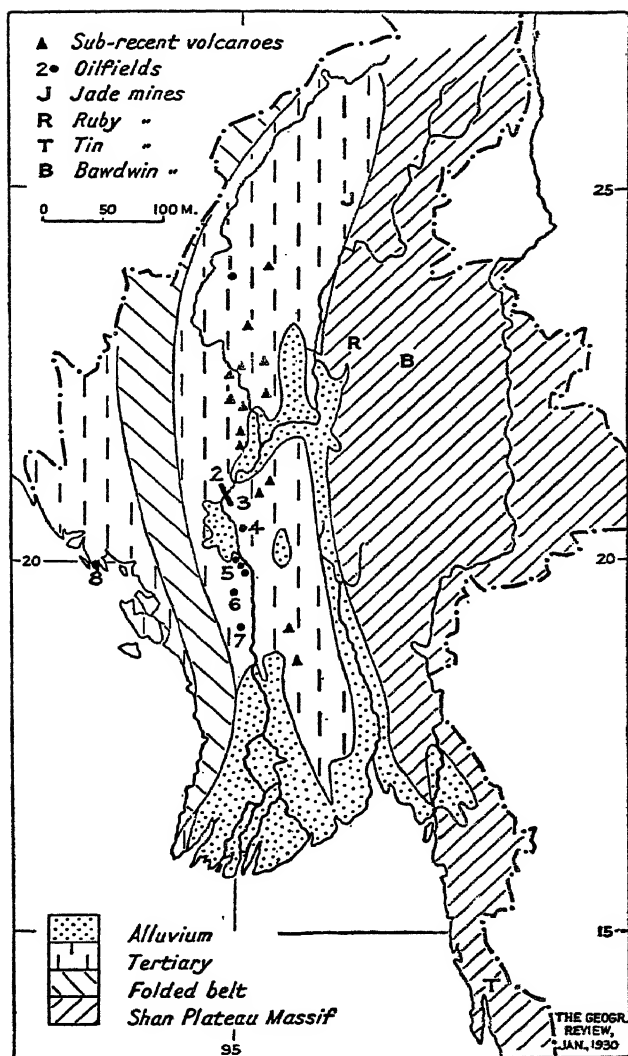


FIG. 185.—An outline geological map of Burma (L. D. Stamp).

Showing the oilfields of Burma, lying in the old gulf between the Arakan Yoma on the west and the Shan Plateau on the east.

The oilfields are numbered:—1. Indaw; 2. Yenangyat; 3. Singu; 4. Yenangyaung; 5. Minbu; 6. Yenanna; 7. Padaukbin; 8. Arakan.

mainly argentiferous galena, which are worked by the Burr Corporation Limited and smelted at the near-by works of Namt-

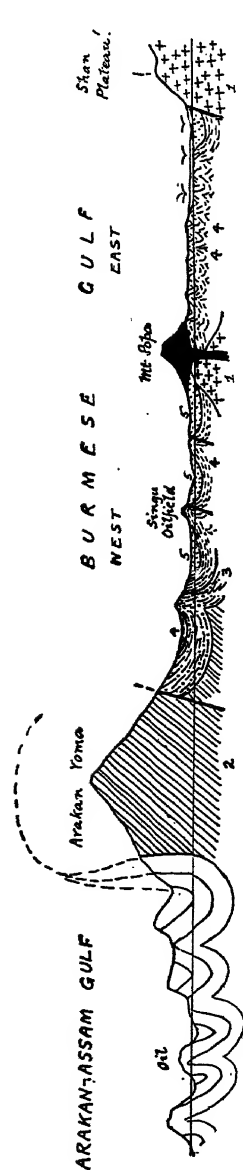


Fig. 186.—Section across Burma from west to east, showing the occurrence of Tertiary rocks (3, 4, and 5) between the old folded rocks of the Arakan Yoma (2) and the crystalline rocks of the Shan Plateau (1). The oilfields occur on the small upfolds in the heart of the Tertiary belt. Mt. Popa is an old volcano.

The refined silver and lead are sent by rail to Rangoon for export. Other silver-lead deposits are known in other parts of the Shan States and have been worked in the past by the Chinese. Tenasserim forms a continuation of the tin-bearing belt of Malaya and large quantities of tin and tungsten are obtained. Geologically this portion of the Indo-Malayan Mountains consists of large granitic intrusions, elongate in the north-south direction and intruded into a series of ancient rocks of unknown age. The basin of the Irrawaddy between the Arakan Yoma and the Shan Plateau consists almost entirely of Tertiary rocks, remarkable for their enormous thickness. This is for the most part a lowland area with ranges of hills—of which the Pegu Yoma is the most important—running from north to south. It is drained entirely by the Irrawaddy and its tributaries, including the Chindwin and in the south-east by the Sittoung. Forming a line down the centre of the basin are the well-known oilfields of Burma. From north to south are the fields of Indaw, Yenangyat, Singu, Yenangyaung, Minbu and several minor fields. The most important fields are Yenangyaung and Singu. Brown coal also occurs in considerable quantities in the valley of the Chindwin and elsewhere in the Tertiary rocks but as yet has been little used. Along a line running roughly along the centre of the ancient Tertiary trough are numerous extinct volcanoes; some form small tuff cones with small crater lakes; others are plugs of rhyolitic

matter, but the largest is the complex cone of Mount Popa reaching a height of nearly 5,000 feet above sea-level.

The Arakan coast of Burma is Pacific in type, it is rocky and dangerous, backed by high mountains and fringed by islands. Of the islands, Ramree and Cheduba are the largest. The Tenasserim coast is similar, in the south is the Mergui Archipelago. Between the Arakan and Tenasserim coasts lies the low delta of the Irrawaddy and Sittang Rivers.

Most of the hilly and mountainous regions were formerly

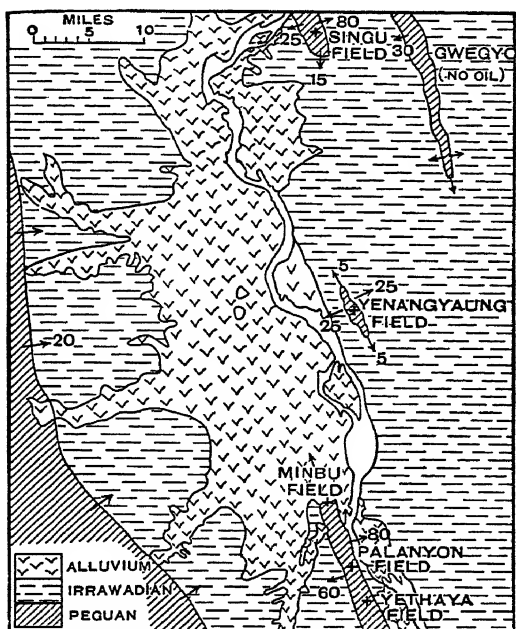


FIG. 187.—Sketch-map showing the position of the Yenangaung Oilfield of Burma.

The Peguan are the oil-bearing strata, and the richness of the field is associated with the isolation of the small upfold and the consequent wide 'gathering ground' for the oil.

forest covered and over large areas have good fertile forest soils. Where clearings have been made, temporary cultivation has destroyed the virgin richness of the soil. In the wetter regions the heavy rains often entirely wash away the soil from cleared hill-sides and expose the bare rock. The limestone rocks of the Shan Plateau are usually covered by a thin red soil, from which the lime has been entirely leached out. The richest soils in the province are the alluvial soils of the flat Irrawaddy Delta and the broad river valleys. Excellent loamy soil is also afforded by the mixed clays and sands of the Peguan rocks, but

the Irrawaddian and other sandy series give rise to extensive tracts of very light soil, almost pure sand. In the wet parts of Burma, owing to the well-marked dry season, a thin mantle of lateritic soil stretches over most of the lowland tracts.

**Climate.** The climate of Burma is closely comparable with that of India: the seasons are the same and no separate description is necessary. Burma has a marked 'dry belt' in the heart of the country which, in a minor degree, acts as a low-pressure

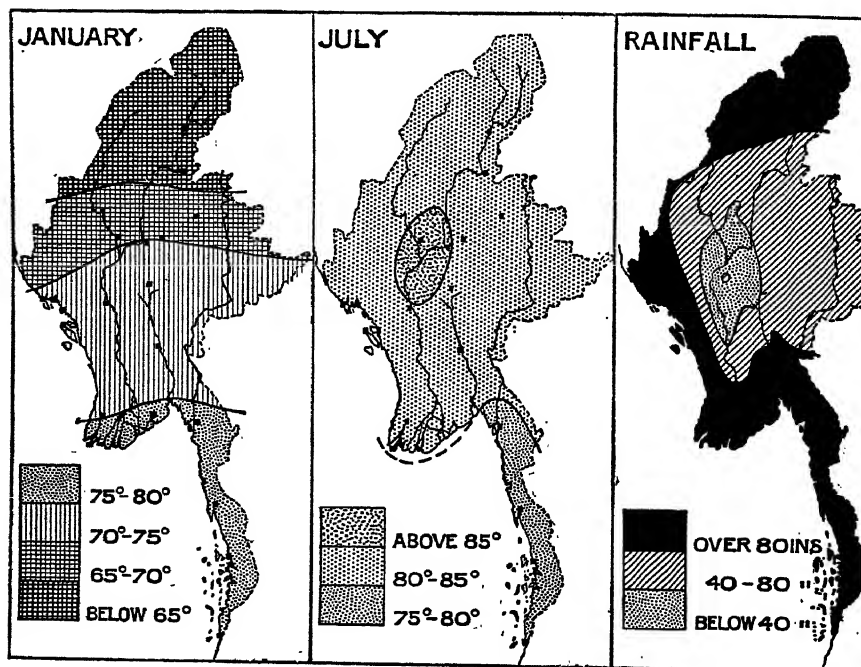


FIG. 188.—The climate of Burma.

area during the rainy season. Both monsoons tend to have north-south direction, owing to the alignment of the mountain and valleys. The great variation in rainfall in Burma is noteworthy. Most of Arakan and Tenasserim have nearly 200 inches of rain; in the heart of the Dry Belt the rainfall is as low as 20 inches. Along the coast, and especially in the south (Tenasserim), both the daily and annual range of temperature are small. In Moulmein the annual range is 8°; in Rangoon it is 10°. Away from the moderating influence of the sea, the range of



temperature increases greatly and is especially large in the Dry Belt. The annual range in Mandalay is  $20^{\circ}$ . The average temperature in the south of Burma is about  $80^{\circ}$ ; it decreases as one goes northwards. In the extreme north sea-level temperature ranges from about  $63^{\circ}$  in January to  $85^{\circ}$  in May.

**Vegetation.** The wide range of rainfall in Burma is responsible for great variations in the natural vegetation. Frost never occurs in the lowlands, but roughly above 3,000 feet the occasional frosts have caused a great change in vegetation. Above that level, which may conveniently be called the frost line, evergreen oak forests, sporadic pine forests and wide areas of open land with bracken and grass are the rule. Rhododendron forests occur at higher levels. Below the frost line the natural vegetation depends mainly upon the rainfall, and the same divisions are distinguished as in India :

- (a) With more than 80 inches of rain, evergreen tropical rain forests occur. The forests are of many species of trees, but more than one-half belong to the Dipterocarpaceæ. The timbers are hard and little used.
- (b) With between 40 and 80 inches of rain are the monsoon forests which lose their leaves during the hot season. These forests are the home of the valuable teak tree as well as of the pyinkado and other useful timber trees.
- (c) With less than 40 inches the forest becomes very poor and passes into scrubland and semi-desert. There is little or no true grassland.
- (d) Extensive areas of the Irrawaddy Delta are clothed with tidal forests, in which some of the trees reach a height of over 100 feet and are of considerable value.

The wasteful methods of the native cultivator have, in the past, resulted in the destruction of vast areas of valuable forest. The practice was to cut down and burn a tract of virgin forest, cultivate the field (taung-ya) so formed for two or three years while the pristine freshness of the soil lasted and then to desert it for a fresh tract. It was but rarely that the forest established itself again over the deserted taung-ya, more often the area became covered with a tangled mass of bamboo, bracken or grass. For more than half a century, however, the Forest Department has been at work, and all the valuable forest areas constituted into Government Reserves. Various privileges are accorded to the natives who live within the reserved area; the timber (mainly teak for constructional work and pyinkado—*Xylia dolabriformis*—for railway sleepers) is worked either by Government or by lessees—public and private companies—under

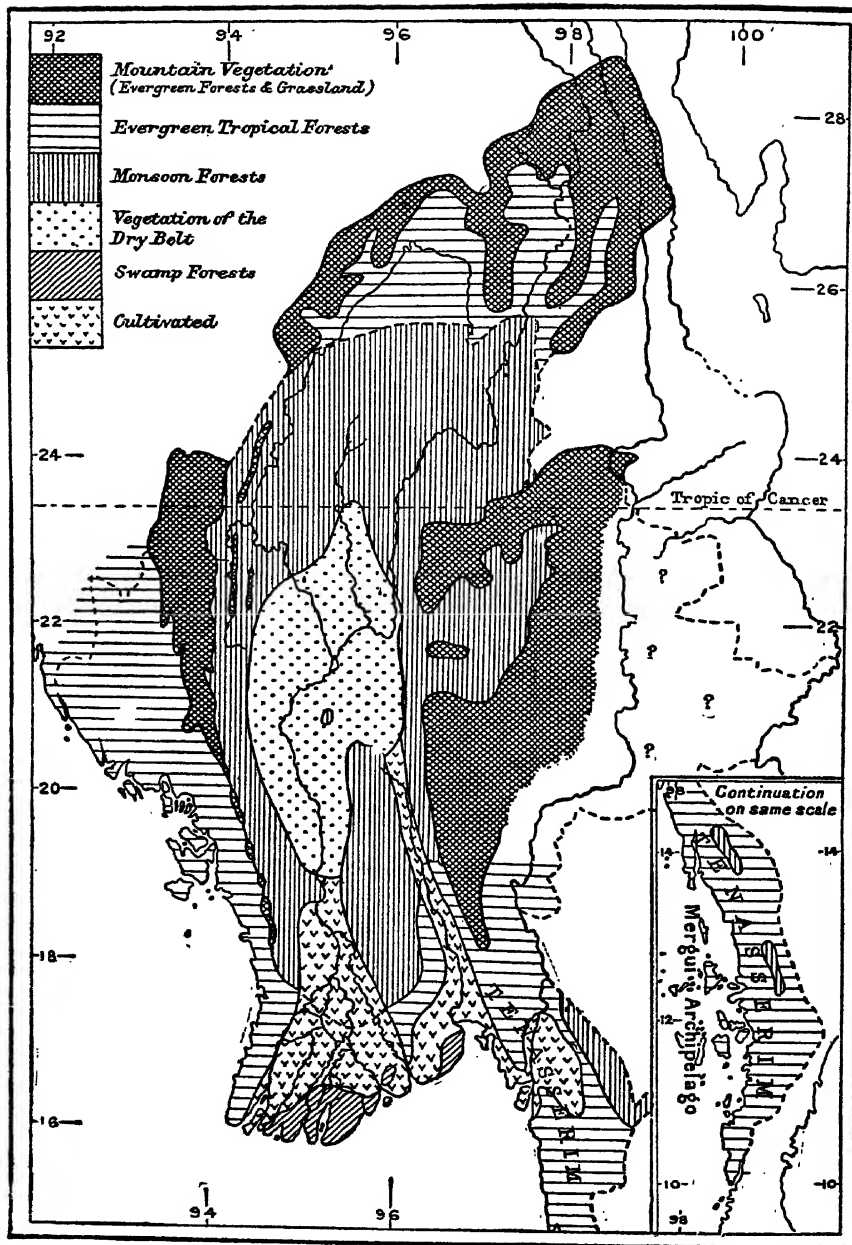


FIG. 189.—The natural vegetation of Burma.

careful supervision. Extraction is so controlled that it shall not exceed regeneration. Timber is third in importance amongst the exports of Burma and for some years past the annual exports



FIG. 190.—The reserved forests of Burma.

The principal forests 'reserved' by the Government are those monsoon forests containing teak and pyinkado and hence are found, as this map shows, mainly in those regions where the rainfall is between 40 and 80 inches annually. The principal exceptions are the tidal forests of the delta.

have been roughly 150,000 tons, worth about £1,500,000. More than half Burma is forested.

### Products.

*Agriculture.* Burma is essentially an agricultural country. Only 11 per cent. of the people were classed as urban in 1931,

and a considerable proportion of this number were natives of India. The agriculture is concentrated on the alluvial lands of the Delta and the valleys of the Irrawaddy, Chindwin and Sittoung. Rice is by far the most important crop and occupies two-thirds of the cropped area. The production of rice is roughly 7,000,000 tons per year, or more than half a ton per head of population. There is, in consequence, a large surplus available for export. As rice has to be transplanted as well as sown and irrigated, it needs a considerable amount of labour expended on it; and the Burman has the reputation of being a somewhat indolent cultivator. The Karens and Shans who settle in the plain expend much more care in ploughing and weeding their crops. Where the rainfall is less than 40 inches rice cannot be grown without irrigation, and cultivation in the Dry Zone is largely concentrated on sesamum, millet, ground-nuts, cotton and beans. In the Dry Belt nearly  $1\frac{1}{2}$  million acres are irrigated. At the

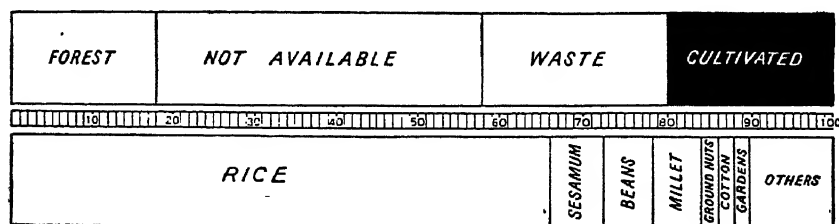


FIG. 191.—The uses of the land in Burma and the chief crops grown on the cultivated area.

time of the British annexation of Burma there were some old irrigation systems in the Kyaukse and Minbu Districts, which had been allowed to fall into disrepair, and these have now been renewed and extended. In addition to this the Mandalay Canal, 40 miles in length, with fourteen distributaries, was opened in 1902; the Shwebo Canal, 27 miles long, was opened in 1906, and later two branches 29 and 20 miles in length, and the Mon Canal, begun in 1904, 53 miles in length. Throughout the country, fruits, vegetables and tobacco with fodder when required are grown for home consumption. In comparison with India, there is room for considerable agricultural expansion in Burma, and official returns class 60,000,000 acres as cultivable waste, as against under 20,000,000 acres of 'occupied' land. Out of about 18,000,000 acres under cultivation<sup>1</sup> the area occupied by the principal crops are:

<sup>1</sup> The figures for 1921-22 and 1925-26 do not include the Shan States and the total concerned was about 16,000,000 acres.

	1921-22.	1925-26.	1930-31.
	acres.	acres.	acres.
Rice . . . .	10,500,000	11,560,000	13,050,000
Sesamum . . . .	1,000,000	1,135,000	1,340,000
Millet . . . .	850,000	700,000	470,000
Various beans .	850,000	—	822,000
Ground-nuts . .	320,000	500,000	560,000
Cotton . . . .	300,000	450,000	370,000

There are numerous rubber plantations, especially in Mergui and Tavoy.

*Domestic Animals.* Small humped oxen are kept everywhere as beasts of burden and for use in ploughing. They are replaced to a considerable extent in the delta and wetter areas by the heavier water buffalo. Herds of small goats are numerous in the Dry Belt, and small numbers of very poor sheep are reared.

*Fisheries.* Fisheries and fish-curing exist both along the sea-coast of Burma and in inland tracts, and afforded employment to 77,000 persons in 1931. Salted fish forms, along with boiled rice, one of the chief articles of food among the Burmese; and as the price of salted fish is gradually rising along with the prosperity and purchasing power of the population, there is room for development. There are in addition some pearling grounds in the Mergui Archipelago, worked spasmodically for mother-of-pearl.

*Minerals.* The most important mineral product of Burma is petroleum. The following table shows the production in recent years:

1909-13 average	236,500,000	gallons.
1918	274,800,000	„
1921-25	276,500,000	„
1926-30	253,600,000	„
1931-35 (est.)	250,000,000	„
(249 gallons = one metric ton.)		

In recent years the value of the output has been Rs. 4-5 crores (compared with 10 in 1921-25).

Very little use has yet been made of the extensive deposits of brown coal or lignite. The most important fields lie in the Chindwin Valley and in old lake-basins of the Shan Plateau. Some of the latter also yield oil shale. Mention has already been made of the silver-lead deposits of Bawdwin; in 1933 the output of silver and lead ore, mainly from these mines, was 472,000 tons, valued at 181 lakhs. The Burma Corporation produced 72,000 tons of refined lead, 5,000,000 ounces of refined silver, as well as zinc and copper. The mines of Tenasserim

produced large quantities of tin and tungsten during the War but the present output fluctuates widely with the price of the metals. The output of tin in 1933 was 4,960 tons, worth 7 lakhs.

The historic Burma Ruby Mines Limited, after many vicissitudes, went into liquidation in 1925-26. The famous jade of China is found in the north of Burma and exported overland to China via Mogaung and Bhamo. The mines are situated beyond Kamaing, north of Mogaung, in the Myitkyina District. The miners are all Kachins. The value varies enormously according to colour, which should be a particular shade of dark green. Semi-transparency, brilliancy and hardness are, however, also essentials. The old river mines produced the best quality. The quarry mines produce larger quantities, but the quality is not good.

Gold is found in most of the rivers in Upper Burma, but the gold-washing industry is for the most part spasmodic in the intervals of agriculture.

Amber is extracted by Kachins in the Hukawng Valley but the quality of the fossil resin is not very good.

Salt is manufactured at various places in Upper Burma notably in the lower Chindwin, Sagaing, Shwebo, Myingya and Yamethin Districts, as well as in the Shan States.

Iron is found in many parts of the hills, and was formerly worked by inhabitants of the country.

**Communications.** From time immemorial the principal highway of Burma has been the Irrawaddy and its tributaries. Even at the present day the railways have rather supplemented than replaced the rivers as highways of trade. The Burma Railways (2,057 miles in 1933) were taken over by the Government of India in January, 1929. They are all metre gauge. The main line runs from Rangoon to Mandalay, where it was formerly interrupted by the Irrawaddy, but is continued on the opposite bank of the river to Myitkyina. A magnificent rail and road bridge, three-quarters of a mile long, was opened in 1934. There is no railway connection with India proper, nor with any neighbouring country. The centre of the oilfields, Yenangyaung, is still only accessible by river. Until a few years ago Burma was virtually without roads, but over 2,000 miles of metalled roads are now open, including a good motor road from Rangoon to Mandalay. Outside Rangoon and Mandalay there are no hotels away from the river and the railways the traveller is forced to use bullock-carts, elephants or mules and it is rarely possible to cover more than an average of 15 or 20 miles a day. There are, however, Government Rest Houses, built primarily for the use of

Government officials on tour, where the traveller may obtain shelter for a nominal payment, though he must make his own preparations for food and bedding. Most of the smaller villages of Burma consist of a collection of from a dozen to a hundred or more huts, built of timber uprights and bamboo. The civil head of the village is the thugyi or headman, chosen by the villagers and recognized by Government; the spiritual head of the village is the senior hpoongyi of the hpoongyi-kyaung. Larger villages or towns arise as collecting or distributing centres or have important bazaars. In many cases their importance has been enhanced by their having been made the administrative headquarters of a district or a division. A large number of the more important towns are river ports—Bhamo, Kalewa, Monywa, Sagaing, Mandalay, Pakokku, Myingyan, Salè, Yenangyaung, Magwe, Minbu, Allanmyo, Thayetmyo, Prome and Henzada afford examples.

**Manufactures and Art.** The staple industry of Burma is agriculture, but many cultivators are also artisans in the by-season. In addition to rice-growing and the felling and extraction of timber, and the fisheries, the chief occupations are rice-husking, silk-weaving and dyeing. The most important of the non-agricultural manufacturing industries is that connected with the working and refining of oil. The principal refineries are at Syriam near Rangoon. The introduction of cheap cottons and silk fabrics has dealt a blow to hand-weaving, while aniline dyes are driving out the native vegetable product; but both industries still linger in the rural tracts. The best silk-weavers are to be found at Amarapura. There large numbers of people follow this occupation as their sole means of livelihood, whereas silk and cotton weaving throughout the province generally is carried on by girls and women while unoccupied by other domestic duties. The Burmese are fond of bright colours, and pink and yellow harmonize well with their dark olive complexion, but even here the influence of Western civilization is being felt, and in the towns the tendency now is towards maroon, brown, olive and dark green for the women's skirts. The total number of persons engaged in the production of textile fabrics in Burma, according to the Census of 1931, was 284,800, against 419,007 in 1901. The chief dye-product of Burma is cutch, a brown dye obtained from the wood of the *sha* tree. Cutch-boiling forms the chief means of livelihood of a number of the poorer classes in the Prome and Thayetmyo districts of Lower Burma. Cheroot making and smoking is universal among both sexes. The chief arts of Burma are lacquer working (centred at Pagan), wood-carving and silver work.

**Population.** The Census of 1921 gives the population of Burma as 13,212,192, with the density of 57—the lowest density of any province of India except Baluchistan and the Andamans

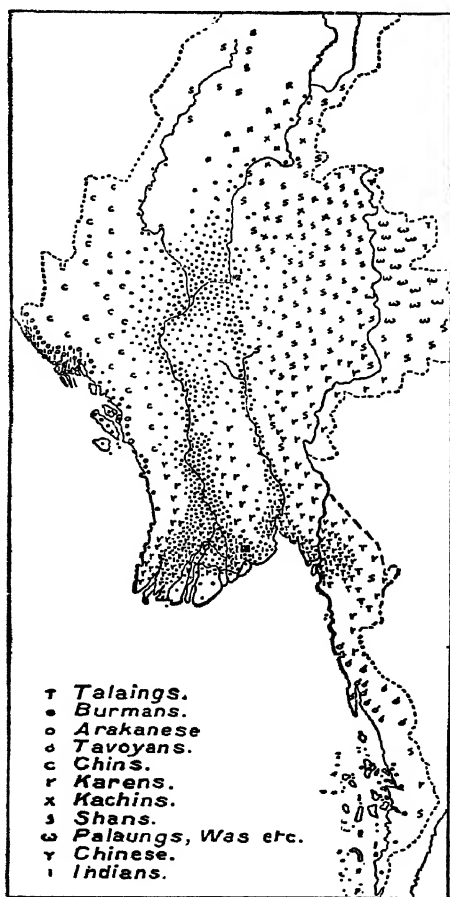


FIG. 192.—The population of Burma, according to the Census of 1921.

Each dot or other symbol represents 10,000 people. The concentration in the valleys of the Irrawaddy and Sittang and the deltas should be noted.

The population had increased in 1931 to 14,667,146. The inhabitants of Burma belong to many races and speak many languages. The indigenous peoples are Mongolians; the Burmans are the most advanced and occupy the fertile lowlands; the other races are



restricted to the hills. Every year large numbers of Indians are attracted to Burma by the higher rates of wages, the opportunities for trading and cultivation, and Rangoon is said to be the largest immigration port in the world. A considerable proportion of the Indian immigrants settle permanently.

It is believed that Burma has been populated by successive waves of migration from the north; indeed, the advance of the Kachin races was still in progress when Burma was annexed to the British Empire.

The Burmans, including the closely allied Arakanese of the Arakan coast, the Talaings of the country around Moulmein and the Tavoyans around Tavoy, number more than 13 millions. They have the broad, flat Mongolian face, but not the almond-shaped eye, of the Chinese. Their skin varies in colour from a pale brown to a dark coffee brown. Some of the town-bred Burmese ladies are no darker than the average north European. The national dress consists of a cylindrical skirt, called a lungyi, worn folded over in a simple fold in the front and reaching to the ankles. All Burmese, of both sexes, prefer silks of bright but delicate shades and even the poorest possesses at least one silk lungyi. The distinctive Burmese silk, woven in the district round Mandalay, is still in general use. The lungyi is worn by both sexes; the men wear also a single-breasted short jacket of sombre hue, called an 'aingyi'; the women's garment is similar but double-breasted and usually white. The older generation of Burmese men wear their straight black hair long, tied in a knot on one side of the head. It is now general to cut the hair in European style. The men's head-dress is a gambauing—a strip of brightly coloured thin silk wound round the head. The women oil their long tresses with coconut oil and coil them in a cylindrical coil on the top of the head. Flowers are used to decorate the hair, but a head-dress is never used.

The Burmans are Buddhists and their religion occupies a large place in their life. The spiritual head of every village is the yellow robed Hpoongyi or monk. The monastery or Hpoongyi-kyaung just outside the village walls—all Burmese villages are surrounded by a fence against wild animals and robbers—is also the village school. Every village has its pagoda, a silent reminder of the precepts of Buddha, and the white-washed pagodas crown almost every hill, but there are no temples in the ordinary sense of the word. As a result of the numerous village schools, the percentage of wholly illiterate men is small. The women are more industrious and businesslike than the men, but their school education has been neglected. The Burmese women enjoy an amount of freedom unusual in non-European

racés. As a whole the Burmese are characterized by cleanliness a sense of humour and a love of sport, but are addicted to a life of ease and laziness.

The various hill tribes are in general less advanced than the Burmese. Perhaps the most advanced are the Karens, who inhabit the Arakan Yoma, the Pegu Yoma and the native State of Karenni. The Shans occupy most of the Shan Plateau and are also found in the upper part of the Chindwin Valley. The Kachins belong mainly to the far north, the Chins to the western mountains, whilst on the Chinese borders are found the Palaungs, Was, etc. Some of the latter are still addicted to the barbarous practice of head-hunting. All the hill tribes of Burma are non-Buddhists; their religion is described by the general term Animism. Christianity has made rapid strides amongst them especially amongst the Karens.

The Indians have settled mainly in the Delta regions, in Arakan and along the rivers and railway lines. Except in the remoter districts, Indians supply nearly all the coolie labour, whilst the indolent habits of the Burman often result in his falling into the clutches of the Indian moneylender. There are roughly a million Indians in Burma, about equal numbers of Hindus and Mahommedans and drawn mainly from Madras, Bihar and Orissa and Bengal.

The Chinese form an important community. Except on the border in the north-east the Chinese belong essentially to the artisan and merchant classes and make excellent law-abiding citizens.

Europeans, mainly English and Scotch, number rather less than 11,000; very few can be regarded as permanent residents. Eurasians (now officially termed Anglo-Indians) number about 22,000.

**Commerce.** The following table shows the progressive value of the trade of Burma since 1871-72 in lakhs of rupees:

Year.	Imports.	Exports.	Year.	Imports.	Exports.
1871-72 . .	316	378	1924-29 . .	4,294	7,329
1881-82 . .	638	806	1929-30 . .	3,900	7,217
1891-92 . .	1,050	1,267	1930-31 . .	3,086	5,757
1901-02 . .	1,278	1,874	1931-32 . .	2,284	4,719
1909-14 . .	2,405	3,723	1932-33 . .	2,033	4,779
1914-19 . .	2,285	3,838	1933-34 . .	1,788	4,761
1919-24 . .	3,882	6,136			

Approximately 86 per cent. of the foreign trade of Burma passes through Rangoon. Other leading ports are Bassein, a

rice port on the west of the Delta ; Akyab, the outlet of Arakan ; and Moulmein, Tavoy and Mergui, which serve the Tenasserim Division. Of the export trade well over one-third is with India, more than one-third with other parts of the British Empire,

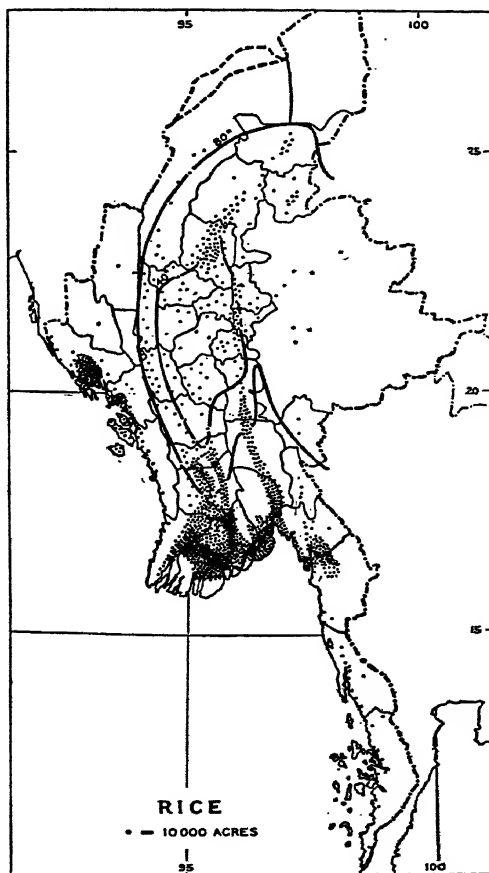


FIG. 192A.—The distribution of rice in Burma (L. D. Stamp).

especially the home country, and only one-quarter with foreign countries. Of the import trade nearly one-half is with India and only one-fifth with foreign countries outside the British Empire.

The principal exports are rice (husked and unhusked), petroleum products, timber, cotton, hides and skins, metals and ores,

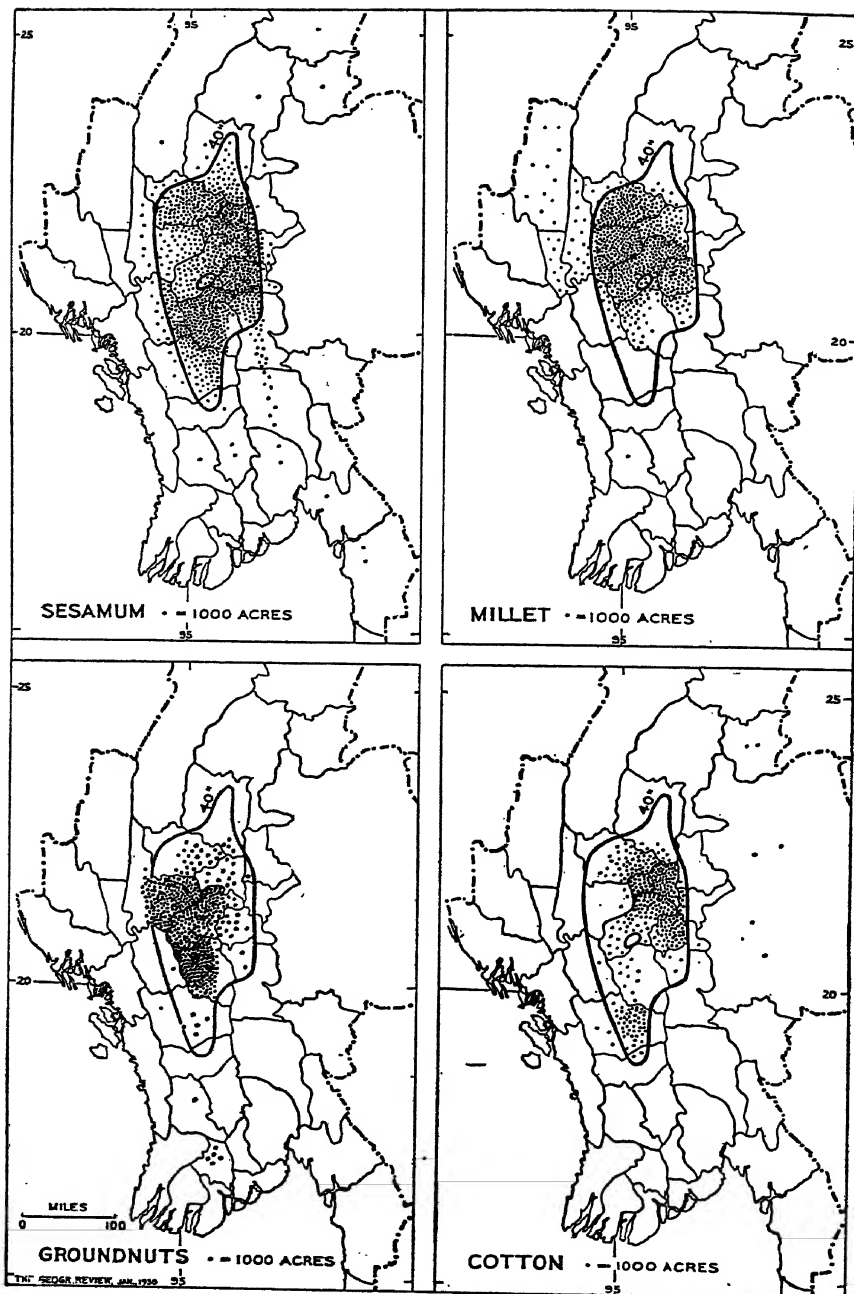


FIG. 192B.—The distribution of the four chief 'Dry Zone' Crops of Burma (L. D. Stamp).

beans, rubber and lac. The export of rice varies between  $1\frac{1}{2}$  and  $2\frac{1}{2}$  million tons, and in 1931-32 represented 65 per cent. of the total exports.

The principal imports are cotton goods, machinery and hardware, coal, silk and sugar.

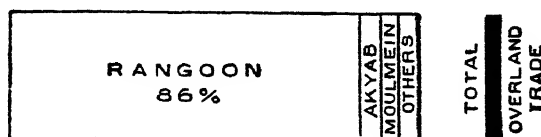


FIG. 193.—The foreign trade of the seaports of Burma, with total foreign overland trade for comparison.

**Natural Regions.** For an adequate study of this large and varied province, a division into at least seven natural regions is desirable :

1. *The Arakan Coastal Strip.* The Arakan coast is of the Pacific type and the folded foothills of the Arakan Yoma approach closely to the Bay of Bengal in many areas. The actual coastal strip, therefore, may be said to comprise those areas which are sufficiently level to permit of settlement and agricultural development but which are both small and scattered, though including a considerable and important tract of alluvium in the hinterland of Akyab, and also a number of large islands such as Ramree Island. The coast is much broken up, both by rocky headlands and islands and by stretches of mangrove swamps. As a result natural harbours are numerous, but the mountainous country of the hinterland and the difficulty of communication across the Arakan Yoma have prevented the development of any considerable ports, with the single exception of Akyab. The whole area has a heavy rainfall, often excessive, and soil erosion by heavy downpours is much to be feared. The remnants of a dense evergreen forest cover exist, but the forest cover has been largely replaced by dense bamboo thickets. Of the cropped land, rice occupies 90 per cent. of the area, whilst the sea provides the second main product, fish. The cultivated land is mainly in the vicinity of Akyab, the chief town and port. Such is the isolation of the region that there is little communication with the rest of Burma except by sea, and the Arakanese speak a distinctive dialect.

2. *Tenasserim.* This region resembles Arakan in many respects—in the north and south alignment of the physical features, in the broken coastline and the limited areas of cultivable land. Geologically there is a contrast—the complex of old sediments penetrated by large granite masses is associated with the occur-

rence of ores of tin and tungsten and a considerable mining development. Climatically the rainfall is heavy, as in Arakan but, being nearer the Equator, the dry season is shorter and renders the area suitable for rubber planting. As in Arakan fishing is important, but the pearling grounds of the Mergu Archipelago are less important than formerly. Many of the smaller islands are inhabited by primitive peoples, often called the sea gypsies. The coasts are sheltered by the outer fringe of islands, and fishing villages of bamboo huts built out over the water occur at frequent intervals. The chief tract of cultivable land—essentially for rice—is in the immediate hinterland of the chief town and port—Moulmein. It exports timber, including some teak from over the Siamese border. A railway from Mergui to Bangkok has long been suggested and would give Siam a port four or five days nearer Europe than Bangkok itself.

3. *The Western Hills Region.* This region comprises the almost uninhabited tracts of the Arakan Yoma and its satellite hill ranges. The hill ranges, of folded sedimentary rocks, have nearly all a north and south alignment. Forest covers most of the hills from base to summit—valuable teak forests on the drier eastern side of the region. It is not surprising to find the region inhabited almost entirely by hill tribes—especially different types of Chins—and such is the isolation of individual valleys that almost every one has its own dialect. The villages are small, internecine warfare is common, life is difficult. The poor crops of maize, millet or hill rice are growing on small patches of shifting cultivation known as taungyas. The appallingly wasteful system of burning down the forest for these clearings has resulted in the destruction of vast quantities of valuable timber. Passes across the region are few and difficult and the foothills are unhealthy and fever-ridden.

4. *The Shan Plateau.* This geographical region coincides closely in extent with the Federated Shan States and is a continuation of the Yunnan Plateau of China and of northern Siam. The word Shan is actually the same as Siam. The plateau has a rolling surface and the Burmese portion is generally between 3,000 and 4,000 feet above sea-level and terminates abruptly on the west in an almost continuous scarp edge 3,000 feet high overlooking the plains of central Burma. The edge has isolated the plateau: until a short time ago wheeled vehicles were unknown in the Shan States—even the familiar bullock-cart. The plateau is sparsely inhabited by hill tribes, of which the Shans are the chief, but which include also Kachins, Palaungs and Was. Some of the latter were, and possibly still are, head-hunters and the territory east of the Salween is largely 'unadministered'. There

are immense tracts of the plateau suitable for crops, including temperate fruits, and the rainfall is believed to average about 60 inches. The minerals are important—especially the silver-lead mines of Bawdwin. The Shan Plateau is now penetrated by two railway lines and several good motor roads. Maymyo is the hot-weather seat of the Government and Kalaw is another hill station. On the surface of the plateau are several lakes, decreasing in size, including Lake Inlé, where are found the famous 'leg-rowers'. The principal villages in the State States are those which form the capitals of the little States which make up the Federation. The ruler of each State is a Sawbwa and the headquarters of the Federation is Taunggyi. Southwards the Shan Plateau passes into the deeply dissected country of Karenni, inhabited by the Karens, drained by the Salween and reached along that river from Moulmein.

5. *The Northern Hills Region.* This region occupies the north of Burma and includes the source of the Irrawaddy and its principal tributary, the Chindwin. The whole territory slopes southwards from the mountain rim and the forested mountains of the north—including much wild country sparsely inhabited by Kachins and Shans and still partly unadministered—give place gradually southwards to lower hills with fertile valleys occupied by Burmans. In the famous 'triangle' between the Mali Kha and the 'Nmai-Kha—the two headstreams of the Irrawaddy—strenuous efforts have been made in recent years to abolish slavery. The Chindwin is navigable by flat-bottomed steamers of small draught to about lat. 24° N., the Irrawaddy regularly to Bhamo, whence there is a well-known trade route to Yunnan. The railway penetrates still further north to Myitkyina, but it is still nearly 300 miles by mule track to the northernmost administrative centre. From this northern region comes the jade so popular in China, as well as some inferior amber.

6. *The Dry Belt.* The Dry Belt occupies the heart of Burma. It is a flat and fairly thickly populated region, extensively cultivated and having some irrigated areas. It is approximately delimited by the 40-inch isohyet and has large areas of light sandy soils. The characteristic 'Dry Zone' crops are well shown in the distribution diagrams. The Dry Belt is the natural heart of Burma, and so long as Burma remained an independent kingdom or land empire, it is natural that the capital of the country should be here. No less than seven former capitals do indeed lie in the Dry Belt—including Mandalay and Ava. All parts are comparatively easily accessible from these centres—especially by river. In the heart of the Dry Belt are the major oilfields.

7. *The Deltas Region.* This region really falls into three sharply marked divisions:

- (a) The lower Irrawaddy Valley and the Irrawaddy Delta—a great alluvial rice-growing area in which communications are mainly by water.

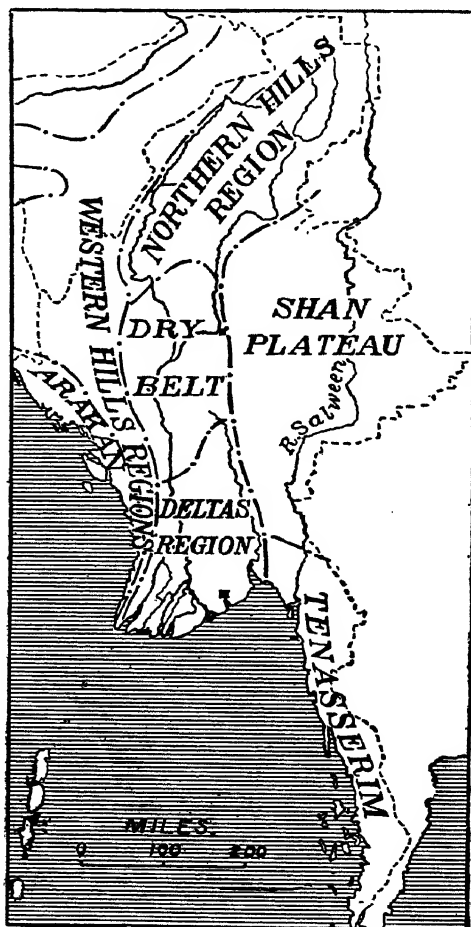


FIG. 194.—The natural regions of Burma.

- (b) The Pegu Yoma—a thickly forested range of mountains supporting both dense evergreen forests and, towards the drier north, deciduous teak forests. The timber is extracted and floated downstream to Rangoon on the west or Pegu on the east.



- (c) The Sittang Valley and Delta—very much narrower and less extensive than the Irrawaddy Delta but providing no less than one-fifth of all the rice grown in Burma. At the outlet of this region is the town of Pegu which gave its name to the former Province.

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## THE ANDAMAN AND NICOBAR ISLANDS

The Andaman and Nicobar Islands form one of the 'minor' provinces of British India, under the charge of a Chief Commissioner who resides at Port Blair. In the Nicobar Islands he is represented by an Assistant Commissioner.

Both groups of islands are very interesting and may in the future play an important part in Indian economy, since there are large tracts suitable for settlement.

## THE ANDAMAN ISLANDS

The Andaman Islands lie in the Bay of Bengal, about 120 miles from Cape Negrais in Burma, which is the nearest point on the mainland. The principal islands form a long line running north and south between Latitude  $10^{\circ} 30'$  and  $13^{\circ} 30'$  North. Five of the largest islands lie close together and are called the Great Andaman; to the south lies the island of Little Andaman. There are, in addition, about 200 small isles in the group, including the Ritchie Archipelago, lying to the east of the main line. The total area is estimated to be 2,508 square miles. The Great Andaman group, though over 200 miles long, is only 32 miles wide at the broadest part.

Geologically the chain forms a continuation of the Tertiary fold mountains of the Arakan Yoma in Burma. The rocks are

believed to be mainly Eocene in age. There are small areas of older sedimentary rocks with large masses of serpentine and areas of limestone believed to be Miocene. To the east of the group, in the Gulf of Martaban, lie the tiny volcanic islands of Narcondam and Barren Island. Coral reefs fringe all the coasts.

The Great Andaman consists of a range of hills of which the highest point is about 2,400 feet above sea-level. The higher hills are usually nearer the east coast, and in general the eastern slopes are steeper than the western. The coast line is exceedingly indented, especially on the east, and creeks run many miles into the islands. Mangrove swamps fringe all the coasts except in the most exposed localities.

The climate may be described as intermediate in character between that of the tropical monsoon lands of India and the Equatorial climate of the East Indies. The temperature varies but a few degrees throughout the year and averages about 85° F. The rainfall is heavy over the whole group and probably averages well over 100 inches (Port Blair, 138 inches). The rainfall reaches its maximum from June to September during the south-west monsoon, but the rest of the year is far from rainless. Many of the dangerous cyclones which are common in the Gulf of Martaban seem to originate in the Andaman Islands.

Except in the neighbourhood of Port Blair and a few other localities where clearing has been carried out, the islands are densely forest-clad from the seashore to the summit of the highest hills. The forest is evergreen and contains many valuable timber trees, the best known of which is the padauk or Andaman red-wood (*Pterocarpus dalbergioides*). The only large mammals are a pig and a civet-cat.

The total population, according to the Census of 1921, was 19,223 (14,258 males and 4,965 females). The islands have been used since 1858 by the Government of India as a penal settlement for life and long-term convicts, but the practice is being discontinued. In 1933 there were 6,791 convicts (including 101 women) in the islands, but 6,514 of them were on parole and supporting themselves. The aborigines only numbered 474 (255 males and 219 females) in 1933; but particular interest attaches to them. They are savages of a low type, belonging to the Negrito race and therefore allied to the Semang of the Malay Peninsula and the Negritos of the Philippine Islands. The Andamanese have been fully studied by A. R. Brown. He estimates that they numbered about 5,500 in 1858.<sup>1</sup> They

<sup>1</sup> They are still rapidly decreasing in numbers. In 1921 there were 786 compared with 474 in 1933.

are short of stature, the men averaging 58½ inches and the women 54 inches. Intensely black in colour, they have the tightly curled hair of the negro but only a slightly prognathous face. The normal costume of the men is a belt or a belt and necklace, but on ceremonial occasions a number of ornaments is worn. The women wear one or more belts of pandanus leaf, which vary in pattern according to whether the woman is married or unmarried. Suspended from the front of the belt is a small apron of leaves. Children are carried in a sling thrown across the body. The Andamanese are organized into tribes and have an elaborate social organization. They believe in 'spirits', and when an Andamanese man or woman dies he or she becomes a spirit.

The Government of India is now encouraging immigration and settlement of the islands and it is hoped that they will afford an outlet for some of the over-populated parts of India. The coconut and rubber tree grow well, and the fibre plants, Manila hemp and sisal hemp, can also be cultivated. Clearings in 1933 amounted to about 72,000 acres out of a total area of 1,600,000 acres. In 1933 there were 11,106 head of cattle and 3,845 goats. The bulk of the population is concentrated in and around Port Blair (14,200 in 1933). Port Blair is in wireless communication with Burma and a weekly mail steamer connects the port with Rangoon, Calcutta and Madras. Port Blair lies on the eastern side of South Andaman, the large southern island of the Great Andaman group. It has a fine natural harbour, well sheltered from the south-west monsoons. Other safe anchorages include Port Cornwallis and Stewart Sound, the latter being conveniently situated for the forest trade.

#### THE NICOBAR ISLANDS

The Nicobar Islands lie to the south of the Andamans, about 75 miles of sea separating the two groups. They were formally annexed by Britain in 1869. There are twenty-one islands, with a total area of 635 square miles. The islands fall into the three groups of Northern (with Car Nicobar as the largest island), Central (with Camorta and Nancowry) and Southern (with Great Nicobar). Geologically the islands form a continuation of the chain of the Arakan Yoma and the Andaman Islands, and consist mainly of Tertiary rocks with intrusive masses of gabbro, serpentine, etc., probably of Cretaceous age.

At the Census of 1931 the Nicobarese inhabitants numbered 9,481 (4,889 males and 4,592 females): in 1921 the number was 9,272. The staple product of the islands is the coconut. The islanders have traded in coconuts for at least 1,500 years,

and the production is estimated at 15,000,000 nuts per annum. Nearly half are sold by barter—there being no coinage—and exported in the form of copra in native craft and Chinese junks. The Nicobarese are immigrants to the islands, where they arrived from Indo-China some time before the Christian era. They are an offshoot of the Mongoloid race, which includes the Burmese, Shans and Malays. The Nicobarese men average 63½ inches in height; the women 60 inches. The skin is yellowish or reddish brown and the hair dark, rusty brown, coarse and straight. They are not naturally prognathous, but the adults are repulsive in appearance, owing to the dilation of the lips by constant sucking of green coconuts and chewing of betel-nuts. Their food is firstly the coconut and secondly pandanus pulp, fish and imported rice. They are intelligent but lazy, truthful and honest, fond of sport and very just. Democratic in their organization, their headmen are naturally chosen and disputes settled by a committee of elders. The Nicobarese wear but little clothing, except on ceremonial occasions.

The Nicobar Islands have a fine harbour (Nancowry Harbour) between the islands of Camorta and Nicobar. A good general account of the two groups is to be found in the *Report on the Census of India*, 1901, Vol. III. A popular account is given by C. B. Kloss, *In the Andamans and Nicobars* (London, 1903). Details of Anthropology will be found in A. R. Brown's *The Andaman Islanders* (Cambridge, 1922), and G. Whitehead's *In the Nicobar Islands* (London, 1924). See also H. S. Montgomerie, 'The Nicobar Islands,' *Geographical Journal*, Vol. LIX, 1922, pp. 36-50.

## NEPAL

The independent Kingdom of Nepal stretches for 500 miles along the curve of the Himalayas, being bounded by the Sarda River on the west and by the Singalela Ridge (which separates it from Sikkim) on the east. It stretches from the tropical jungles of the Terai on the south to the eternal snows of the main Himalayan Range which in general forms the northern frontier. The total area is about 55,000 square miles and the population estimated at about 5,600,000. The country is closed to Europeans and until very recently was one of the least known parts of Asia. It was only in 1924 that the Prime Minister asked for help from the Survey of India in undertaking a detailed survey of the country, and the first accurate skeleton map, contoured, was published as a frontispiece to the *General Report of the Survey of India*, 1926-27.

The country falls into four drainage regions—from east to west the Kosi system of the Kosi and its seven tributaries; the valley of Nepal drained principally by the sacred Bagh Mati; the Sapt Gandakis system (or the seven rivers which unite to form the Gandak), and the Karnali system.

The name Nepal is properly restricted to the valley of Nepal—known in Nepal itself as 'the country contained within the Four Passes'—to the east the Saga Pass, to the south the Phar Ping, to the west the Panch Mané, to the north the Pati Pass. This valley, 'the historic heart of the whole country, the ancient centre of culture in a sea of mountains, is the one considerable piece of flattish ground to be found on the southern slopes of the Himalaya until the far greater western valley of Kashmir is reached'. The valley is only about 15 miles long and 7 miles wide, thickly populated and includes the capital, Katmandu (80,000).

The ruling race in Nepal is that of the Gurkhas, one of the most famous of the world's military races, whose warlike energies find an outlet in the organization of the Government on military lines—even the judges have military titles—and in voluntary service in the British Indian Army. The reigning family are Hindu Rajputs, but the chief power is in the hands of the Prime Minister (an hereditary office), to whom it was permanently delegated by the King in 1867. The march of progress is apparent even in Nepal: slavery was abolished in 1924-26, the capital connected with the outside world by telephone and the first railway opened in 1927. This railway penetrates 25 miles into the country, and the journey to the capital can be completed partly by motor road and partly by mountain track. The life of the country centres round Katmandu; the great feature of village life in the mountains is the weekly fair. For further information on this fascinating country, reference should be made to the article 'Nepal' by General C. G. Bruce and Major W. B. Northey, *Geographical Journal*, Vol. LXV, April, 1925, pp. 281-300.

## CHAPTER V

### CEYLON

**G**EOGRAPHICALLY Ceylon is closely allied to Peninsular India, from which it is separated merely by the narrow and shallow Palk Strait. The coastal settlements have formed part of the British Empire since 1796, being

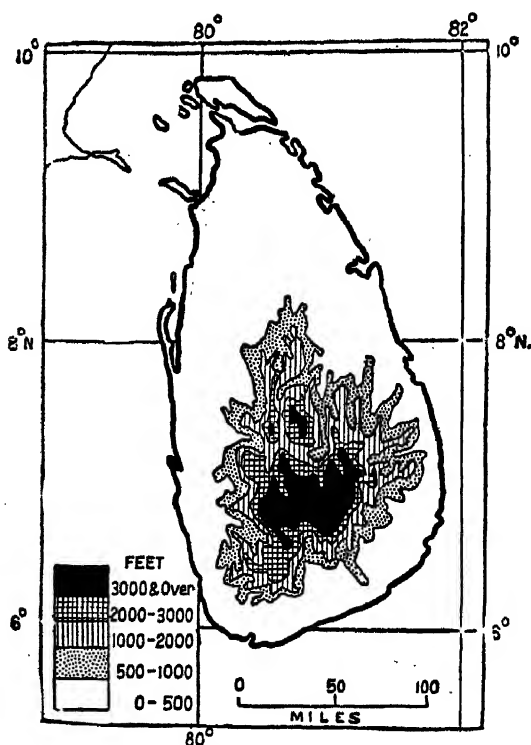


FIG. 195.—Physical map of Ceylon.

constituted a Crown Colony in 1802, and since 1815 the whole island has been British territory.

The island is shaped roughly like a pear, and lies between 5° 55' and 9° 50' of North Latitude; it is this southerly situation combined with an insular position which gives Ceylon a climate approaching the Equatorial, and renders it worthy of a separate

consideration from the neighbouring parts of India. The longest diameter of the island is from north to south and is roughly 270 miles. The area is 25,332 square miles (65,630 sq. km.).

**Physical Features and Geology.** The island consists of a central mass of mountains, surrounded by broad coastal plains. Many of the central mountains are high, rising to over 6,000 feet, and include such famous peaks as Pidurutalagala (8,292 feet), overlooking the well-known hill station of Nuwara Eliya; Kirigalpotta (7,857 feet); the lower but still more famous Adam's Peak (7,360 feet) and Namunukula (6,679 feet). In the north the coastal plain is almost flat, elsewhere its surface is somewhat irregular. The rivers are all short and radiate from the central mass of mountains. They are not of very great importance, though in the drier parts of the island innumerable streams are dammed to form tanks; whilst round the coasts the rivers empty into shallow coconut-girt lagoons, to which reference will be made later.

The mountains of Ceylon consist of crystalline rock of Pre-Cambrian age, closely allied to and originally forming part of the great massif of Peninsular India. These old rocks in Ceylon are noted for the beautiful gemstones, especially sapphires, obtained from them. The gems are mainly obtained from pockets of weathered rock and from alluvial deposits along the western slope of the mountain mass, and are worked in hundreds of little quarries. Besides sapphires, rubies, moonstones, cats-eyes and other stones are obtained. The best stones are sent to Europe and America, the poorer to India. The annual output is worth about Rs. 2,000,000. Another important mineral obtained in the old rocks is graphite. The Pre-Cambrian rocks also underlie the coastal plain, but there they are covered by a thick coat of laterite ('Kabouk'). The formation of laterite is seen in Ceylon to perfection. Laterite is formed in most warm countries which enjoy an alternation of wet and dry seasons. In the wet season the rain-water acts chemically on the superficial layers of the rocks and many salts pass into solution. In the dry season the surface dries and a deposit of iron and aluminium salts is left. As the surface waters evaporate, fresh supplies are drawn up from below by capillary action. The resulting laterite has a cellular or sponge-like texture, the network consisting mainly of oxides of iron, the spaces being filled with residual matter, largely quartz grains. The laterite hardens on exposure to the atmosphere, and the residual matter is washed out of the pores by the mechanical action of rain, resulting in a porous rock much used in Ceylon for building and for road metal. Where the

rainfall is sufficient, the laterite affords a rich red soil. The surface of the underlying crystalline rocks is irregular, and at intervals around the coastal plain the old rocks appear at the surface through the coating of laterite. In the north of the island the old rocks have been covered by soft limestone of Tertiary age. All round the island are sand-dunes thrown up by the sea, and very frequently extensive fresh-water or brackish-water lagoons lie behind the sand-dunes or sandy beaches. In the north of the island are certain sandy peninsulas and the sandy island of Jaffna. The end of the Mannar Peninsula is only 22 miles from the nearest point of India (the port of Dhanushkodi). Ceylon is nearly joined to India between these two points by a line of rocks and sandbanks called Adam's Bridge. Fringed as it is by sandbanks, the coast of Ceylon is for the most part low, but at intervals the old rocks appear at the surface, and give rise to rocky headlands, as, for example, the Point de Galle, at the entrance to the old port of Galle. Some of the larger lagoons, already mentioned, are open to the sea and form deep indentations along the coast. Coral flourishes round the island; coral reefs are numerous and much of the sand consists of comminuted coral.

**Climate.** For a tropical country, the climate of Ceylon is comparatively healthy. Nearness to the Equator results in the temperature being high throughout the year, but heat is less oppressive than in most parts of India. The presence of the sea keeps the climate equable, and everywhere along the coast land and sea breezes are felt. There is little difference between the temperature of day and night—the daily range at Colombo is only 12° F. The annual range is also small. January is usually the coldest month, and May the hottest, but around the coast there is only a difference of about 5° between the mean temperatures for the two months. The mean annual temperature for the coastal districts is about 81° F. In the interior there are several hill stations, notably Nuwara Eliya (pronounced Nuralia), which are delightfully cool throughout the year.

Although Ceylon is a comparatively small island, the rainfall varies greatly—from less than 40 inches in the dry regions to over 200 in exposed situations. Ceylon gets its rain both from the south-west and the north-east monsoons. There is a heavy rainfall on the west and on the south-west coasts and on the mountains from the south-west monsoon, the rain falling mainly between June and October. On the north-east coast and the eastern slopes of the mountains the heavy rainfall is later in the year—mainly in November and December, and is derived



from the north-east monsoon. Amongst the hills the constant mists of the rainy season are apt to be unpleasant. The northern part of the island has no hills to intercept the winds, and is a dry region. So also is the south-eastern part of the island.

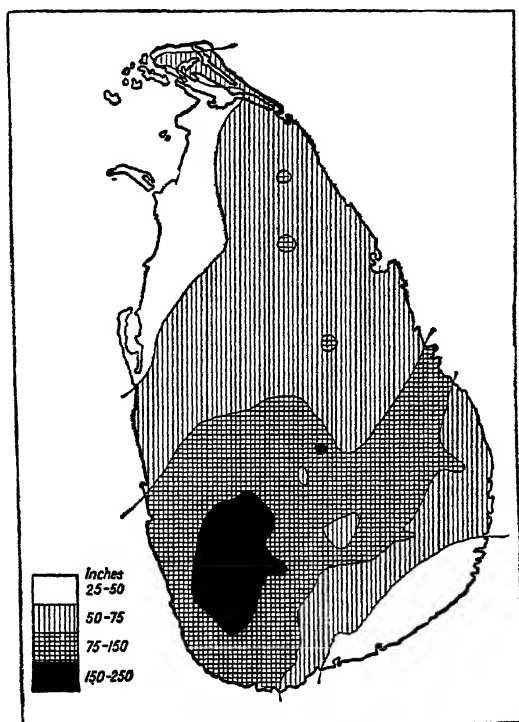


FIG. 196.—The average annual rainfall of Ceylon.

The following figures illustrate the varying types of climate found in the island:

	Alt. feet.		Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Colombo .	24	Temp. °F. Rain, in.	79 3·2	80 1·9	81 4·7	81·5 11·4	82 12·1	80 8·4	80 4·5	80·5 3·8	80 5·0	79 14·4	79 12·5	79 6·4	80 88·3
Jaffna . .	20	Temp. °F. Rain, in.	77·5 2·7	79 1·3	83 1·2	86 2·0	85 1·7	84 0·7	83 0·9	83 1·5	83 2·9	82 9·4	79·5 14·4	78 10·3	81·8 48·8
Trincomalee	99	Temp. °F. Rain, in.	78 5·7	79 2·2	80 1·4	83 2·1	85 2·4	84 1·4	83 2·1	83·5 4·5	83 4·2	81 8·0	79 13·6	78 15·3	81 62·9
Nuwara Eliya	6,200	Temp. °F. Rain, in.	57·5 5·9	57·5 2·0	59 3·5	60 5·6	62 6·9	60 12·7	59 12·0	60 8·0	59·5 8·5	60 11·0	59 9·1	58 8·4	59·3 93·3

**Vegetation.** Just as the climate of Ceylon varies greatly from place to place, so does the natural vegetation. The lower slopes of the mountains used to be covered with thick evergreen rain-forest. Now much of the forest has been cleared to make room for rubber plantations and tea gardens, and there is little timber of value left. The wetter parts of the lowlands were also covered with wet evergreen forests, but the drier parts were occupied by scrub forests of a drier type. The forests remaining are carefully controlled by Government and yield a valuable supply of firewood for the railways and general purposes, as well as timber in the log which is used by the saw-mills of Colombo. The production of sleepers is decreasing, also that of firewood (which is being replaced by coal). The trees are mostly native hardwoods, but fast-growing eucalypts as well as conifers are being used in plantations. The famous satinwood and ebony of Ceylon are slow-growing trees of the drier forests. A great part of the wetter land is now used for rice and coconuts, but the drier parts are still largely untouched. Taking the whole of Ceylon, about one-fifth is cultivated; about one-fifth is covered with thick forest. 'Chena' or 'hena' (i.e. shifting) cultivation is practised in many parts, especially of the hills (cf. *taung-ya* in Burma), but there remains a considerable area of waste land which might be utilized.

**Population.** According to the Census of 1931 the population of Ceylon was 5,306,863, exclusive of 1,387 military and 4,290 shipping employees who happened to be in Ceylon at the time when the Census was taken. The population shows an increase of 18 per cent. since 1921. The principal race is the Sinhalese (formerly known as Cingalese or Ceylonese), who, in the sixth century B.C., came from the north, and conquered the island. There are now two main groups of Sinhalese—the low-country Sinhalese and the Kandyan Sinhalese. The Sinhalese are Buddhists by religion, Buddhism having been introduced from India in the third century B.C. The natural centre of Buddhism in Ceylon is Kandy, the old hill capital. At Kandy is the so-called Temple of the Tooth, where a supposed tooth of the Buddha is preserved. The north of Ceylon is inhabited mainly by Tamils, who are Hindus by religion, and who came over from India either as conquerors in past ages or in recent times as labourers in the tea gardens, and on the rubber and coffee estates. The two groups of Tamils are often separated as the Ceylon Tamils and the Indian Tamils. The Moors, who number a quarter of a million, are traders, boatmen or fishermen, who came originally from North Africa. They are Mahomedans by religion. The descendants of the old Portuguese and Dutch settlers, though considerably mixed with native

blood, form a well-marked community and are known as Burghers. Europeans in 1921 numbered over 8,000. In the wilder parts of the mountains there are still a few thousand Veddas—members of a very primitive hill tribe, of great ethnological interest—but they are rapidly decreasing in numbers. The people of Ceylon live mainly on the wetter parts of the plains, and in the hills; on the dry infertile soils of the northern region, and in the east, there are very few inhabitants. The

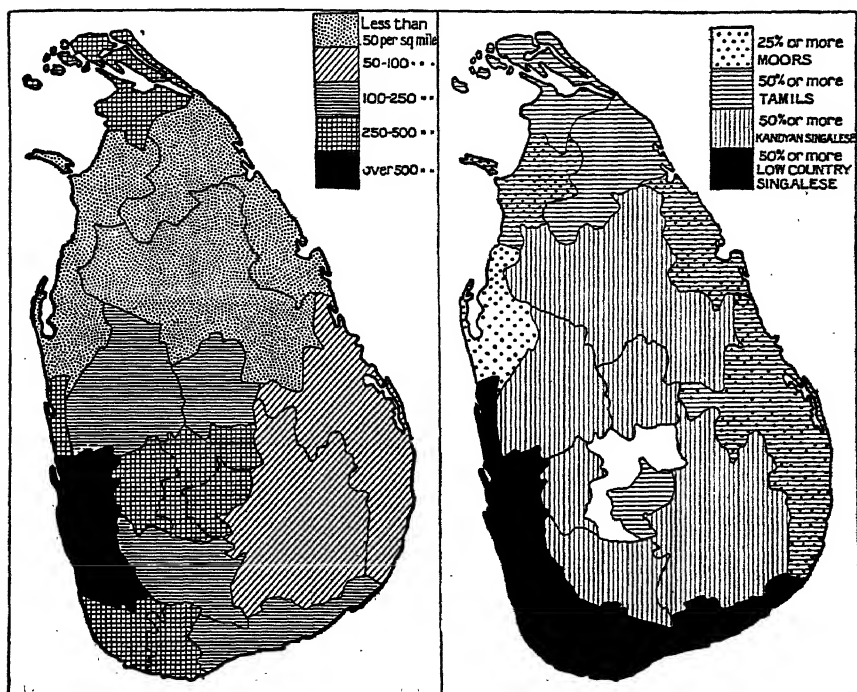


FIG. 197.—The population of Ceylon.

The first map shows its density and illustrates the comparative sparseness in the northern plain and in the eastern coastal areas. The second map shows the composition of the population and stresses the concentration of the Tamils in the north and of the old seafaring Moors along the coasts. It may be surprising to see that in the heart of the island, around Kandy itself, the Kandyan Singalese drop below 50 per cent. This is due to the large numbers of Tamil coolies employed on the tea estates.

(Based on the last complete census—1921.)

occupation of 62 per cent. of the population is agriculture, 12 per cent. are engaged in industrial occupations, and 8 per cent. in trade. The urban population is 13 per cent. of the whole, the principal towns (1931) being: Colombo, 284,155; Galle, 38,424; Jaffna, 45,708; Kandy, 36,541.

In 1921 the adherents to the principal religions were: Buddhists, 2,769,805; Hindus, 982,073; Mahommedans, 302,532; Christians, 443,400. The total population in 1921 was 4,497,853.

The two principal vernacular languages are Cingalese and Tamil ; English is the principal commercial and official language. Education is free in the vernacular schools, but fees are charged in English schools. Vernacular schools are classed as Government, Government aided, and Unaided. In all there are over 4,500 schools attended by about 330,000 boys and 200,000 girls. There are also technical and industrial schools, and a University College was opened in 1921.

The Sinhalese have a characteristic native dress. Both sexes wear a cylindrical skirt, like the Burmese lungyi (see Burma). The women wear a tight cotton bodice and a loose jacket of some thin and light material. The better class Sinhalese men wear a white jacket, cut on European lines, with a high collar. The older generation of Sinhalese men wear the hair long and knotted at the back, whilst the crown of the head is surrounded by a curious comb, consisting of a piece of tortoise-shell bent to form three-quarters of a circle, a remnant of the days when Dutch settlers demanded tidy hair among their servants. It has very short teeth and the ends are finished off into points. It is placed on the head as a crown would be with the points forward. The present generation favours short hair, and the use of the comb is becoming less general. The Tamils in Ceylon retain their native dress.

**Government.** The first Europeans to settle in Ceylon were the Portuguese in 1505, who formed settlements along the south and west coasts. About the middle of the next century the settlements were wrested from them by the Dutch. The old Dutch forts are still to be seen in Galle and other places, and, though the fort itself has disappeared, the heart of Colombo retains the name and is still known as The Fort. Many of the older European bungalows in Ceylon show the type of construction which is still prevalent in the Dutch East Indies. In 1796, the foreign settlements of Ceylon were annexed by the British Government to the Presidency of Madras, but in 1802 Ceylon was separated from India to form a separate Crown Colony. In 1815 the interior districts of the island were annexed as a result of a rebellion by the King of Kandy. Ceylon is entirely separated from India in all matters of Government. The constitution has been modified several times since it was drawn up in 1833, and since 1931 the administration of the colony has been as follows. At the head of the administration is the Governor, appointed by the British Colonial Office. He is aided by ten ministers, seven elected and three official, and by a State Council of sixty members. Of the sixty members, three are officials, eight are nominated by the Governor to

represent special interests and the remainder are elected by the people (fifty territorial divisions).

For purposes of Government the island is divided into nine provinces—Western, Central, Northern, Southern, Eastern, North-Western, North Central, Uva, and Sabaragamuwa. Each province is presided over by a Government Agent.

The unit of currency is the rupee, which is divided into a hundred cents. The rate of exchange has been fixed, the rupee being worth one shilling and sixpence, or 13.3 rupees to the pound sterling. The revenue dropped severely during the depression, but averages 100,000,000 rupees. The income is derived from Customs, railways, alcoholic licences, stamp duties and port dues.

**Natural Regions.** A simple division of Ceylon may be made into three: (a) the hill country of the centre; (b) the belt of lowland of varying topography lying between the hill country and the sea; (c) the Jaffna Peninsula and the limestone region of the north. The lowland or Maritime Belt varies, however, greatly in character according to variations in climate (especially rainfall) and a subdivision is desirable.

Miss E. K. Cook has suggested the division of the island into the regions shown in Fig. 197A.

**The Hill Country**, formed by the mountainous centre of the island, falls into a main mass and a south-western extension (No. 13 of Fig. 197A)—the Sabaragamuwa hill country. The region as a whole consists of ridges separated by deep valleys, or occasional broad marshy or grassy plains surrounded by mountains. Comparatively little is now left of the vast forests which covered the region before the days of European planting. The trees are nearly all evergreen and get smaller the higher one goes, so that above 5,000 feet the trees are too small to be of any use as timber. The rainfall of most of the region is heavy; the rain does not fall so heavily as on the plains, but is more continuous, and for days or even weeks together the sun may be hidden by dense clouds of mist. The greater part of the rain falls from June to October, during the period of the south-west monsoon. Nearly all the tea-gardens are found in this region as well as many of the rubber plantations. Cacao is grown north and north-east of Kandy, the old capital of Ceylon; which is 1,650 feet above sea-level and 72 miles from Colombo by rail. A few miles from Kandy is Peradeniya, famous for its Botanical Gardens. The native inhabitants of the hill country are the Kandyan Sinhalese, who have carefully terraced for rice cultivation many of the steep hillsides. A large amount of coffee used to be grown in Ceylon, but, still more than in southern India, the trees were swept away by disease.

The minor regions of the hill country shown on Fig. 197A are :

(1) *The Adam's Peak Ridges* enjoy—or suffer from—the heaviest rainfall in the island and the continuously moist atmosphere causes much inconvenience. The shrine on Adam's Peak attracts many pilgrims in the driest months, but the region was almost uninhabited until its suitability for tea was realized.

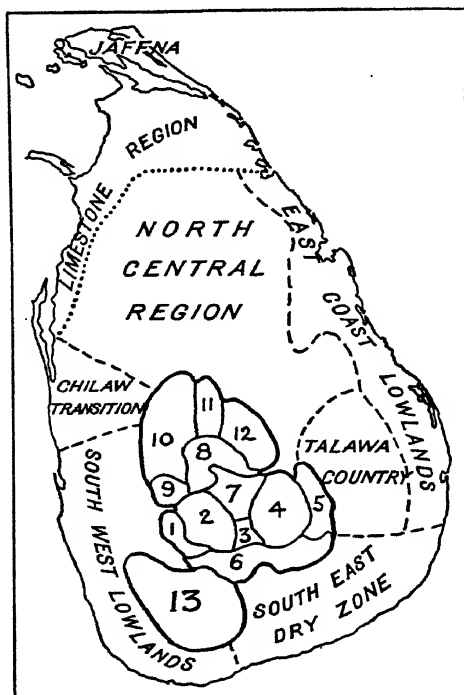


FIG. 197A.—The natural regions of Ceylon (after E. K. Cook).

For explanation, see text. The limit of the limestone after E. J. Wayland, *Quart. Jour. Geol. Soc.*, LXXIX, 1923.

(2) *The Hatton Plateau* is slightly drier (150 inches) and the area has become almost one vast and continuous tea-garden. The principal inhabitants are English tea-planters and their Tamil labourers.

(3) *The High Plains* form a grassy plateau with few people, though the climate is healthy and bracing.

(4) *The Uva Basin* is surrounded by mountain ranges and so is comparatively dry and bracing. It is naturally a grass-covered area—the 'Uva Downs' and former rice lands of the valley floors are less important than the tea-gardens of the hillsides. The chief town is Badulla.

(5) *The Lunugala Region* is a long wall-like ridge with a flanking eastern platform bounding the Uva Basin on the east. Formerly scantily peopled, the clearings for tea and rubber are comparatively recent.

(6) *The Southern Platform* 'is like an immense natural step, with a rapid rise from the flat low country to the 1,000-foot level and lies in front of the steep southern wall of the hill country proper. It is intermediate in character between the low country and the hills and seems to offer considerable possibilities of development'.

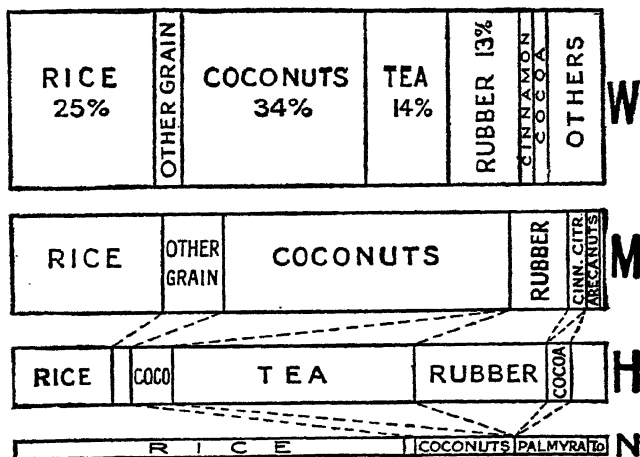


FIG. 198.—The crops of the whole of Ceylon (W) and of the three natural regions.

M. Maritime Belt; H. Hill Region; N. Northern Region. (Note.—Cinn. Citr. = Cinnamon and Citronella.)

(7) *The Piduru Ridges* comprise a central knot with many of the highest peaks in the island from which radiate steep ridges and deep valleys. It is naturally the coolest part of the island, forested and inaccessible, with rhododendron predominating in the higher parts. The delightful hill station of Nuwara Eliya has been established in a beautiful mountain basin in the shadow of Pidurutalagala. Here many temperate crops can be grown, including most of the fruits and vegetables of England.

(8) *The Kandy Plateau* has for long been the most populous and well-developed part of the hill country. Its accessibility rendered it a suitable area for the siting of a capital (it became the hill capital in the sixteenth century). Buddhist pilgrimages to the Temple of the Tooth are an important feature of the life of Kandy.

(9) *The Dolosbage Group* is a block of hills cut off from the main mass by the valley of the Mahaweli Ganga. The forests have been cleared but recently for planting—especially of rubber.

(10) *The North-Western Uplands* form a transitional region with rubber, coconuts and cacao.

(11) *The Matale Valley* is a 'stuffy' enclosed valley, opening out into the northern plains in the north and affording a route to Kandy on the south. Tea and rubber are the leading crops, but there is a considerable cultivation of cacao and an extensive series of paddy terraces along the floor of the valley.

(12) *The Knuckles Group* lies to the east of the Matale Valley and is the part of the hill country most influenced by the north-east monsoon.

(13) *The Sabaragamuwa Hill Country* is one of the most lonely and wild parts of the island and still a haunt of numbers of wild elephants. It consists of a series of ridges trending from north-west to south-east, separated by deep valleys. Ratnapura, in this region, is the centre of the gem-mining industry.

**The Lowland Belt** for the most part is rolling country, not exceeding 1,000 feet in height and for the most part with a thick red lateritic soil except along the coastal strips.

*The South-West Lowlands*, or low, wet country, come under the influence of the south-west monsoon and have a rainfall of between 75 and 100 inches. There is often too much water: floods are common and drainage is a leading problem. The level lands and the valleys are occupied by rice fields (usually yielding two crops a year, one after each monsoon). The higher lands towards the hills are covered by the peculiar mixed tree cultivation of the Sinhalese. Each farmer has coconuts, areca-nuts, mangoes, yaks and bread-fruit, together with yams and small plants like pepper. On the borders of the hill country are rubber plantations and tea-gardens. All along the sandy coasts are groves of coconuts. The husks are allowed to soak and rot in the shallow lagoons and so the fibre (coir) is obtained. Industries connected with the coconut find employment for large numbers of people. The kernels are roughly dried for export as copra. Even more important is the export of carefully dried or 'desiccated' coconut prepared in factories. There are also factories for the preparation of coconut oil. The preparation of coir is mainly a cottage industry. Areca-nuts (betel-nuts) are also grown for export. Of the spices for which Ceylon has long been famous, cinnamon is the most important. The cinnamon tree likes a light sandy soil, and grows in those parts of the coastal regions where such a soil is available. The cinnamon of commerce is obtained from the inner bark of young



shoots. The industry is less important than formerly. Other spices include cardamoms and cloves. Citronella oil, prepared from a grass, is also obtained mainly in the south-west. This is the most densely populated part of the island, villages and isolated human habitations being very evenly spread over the whole area. The larger towns are near the mouths of the more important rivers or lagoons and include Colombo, Negombo, and Matara. Except in such towns, most of the people are Low-Country Sinhalese, though along the coast are many Moors. The fishing-boats are the well-known catamarans and outrigger canoes, made from coconut palm logs or jak trees and having a log attached to one side by two connecting wooden poles.

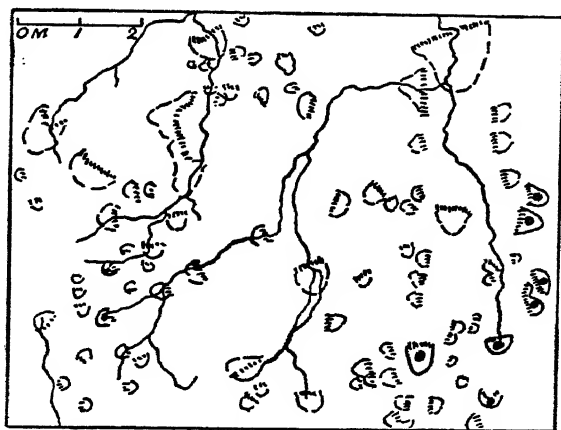


FIG. 198A.—Tanks along the stream courses of the North Central Lowland. Only those marked with a dot are now used.

The capital of Ceylon, Colombo, is on the west coast. It has now a fine artificial harbour and is a port of call at the junction of many ocean routes as well as being the commercial centre of the island. Before the harbour of Colombo was finished, Galle in the south-west used to be the principal port of call. The entrance to the rock-girt harbour is still guarded by an old Dutch fort.

*The Hambantota Dry Zone* is characterized by a deficiency of rainfall and has less than 50 inches a year, whilst evaporation is strong. Thorn scrub predominates, but small trees of the interior include ebony and satin-wood. To-day there are few inhabitants, but in the past there were 'tanks' and more people. Dry-zone crops such as cotton and ground-nuts may prove the salvation of this area.

*The East Coast Lowlands* form a flat strip 10 to 30 miles wide with an almost continuous succession of lagoons and marshes cut off from the ocean by coconut-clad sandbanks.

Mangrove swamps fringe most of the lagoons: the coast is lined by a succession of villages facing away from the stormy sea and paddy land occupies all flat stretches. The rainy season is that of the north-east monsoon and the coast is hot during the period of the south-west monsoon. Batticaloa lies at the exit of a long series of connected lagoons; Trincomalee, on a large bay with a protected deep-water harbour, has long been a British naval base and recently a naval oil fuel dépôt.

*The North-Central Region* occupying a large area in the northern half of the island was once a fertile, thickly populated tract with innumerable 'tanks' or storage reservoirs on every



FIG. 198B.—The worst malarial districts of Ceylon (shown in black) (after E. K. Cook).

river. But the region was deserted—probably as a result of the ravages of malaria or other diseases—and most of the tanks fell into disuse and are marked to-day only by unhealthy swamps. Dense jungle now stretches like a sea over hundreds of square miles and hides the poor remnants of the former tank villages and the wonderful ruined cities such as Anuradhapura—a capital city as long ago as the fifth century B.C. The modern Anuradhapura has been made a focus of rail and road routes.

*The Talawa Country* is a distinctive tract, isolated and consisting of savana (grassland dotted with trees—the 'talawa' of the Sinhalese). Here live most of the very primitive Veddas—the aboriginals of Ceylon.

*The Chilaw Transition Zone* lies between the South-West Lowlands and the North Central Lowlands.

The Jaffna Limestone Region as indicated on Fig. 197A has been demarcated according to the extent of the almost horizontal beds of limestone, partly of Miocene Age. The most

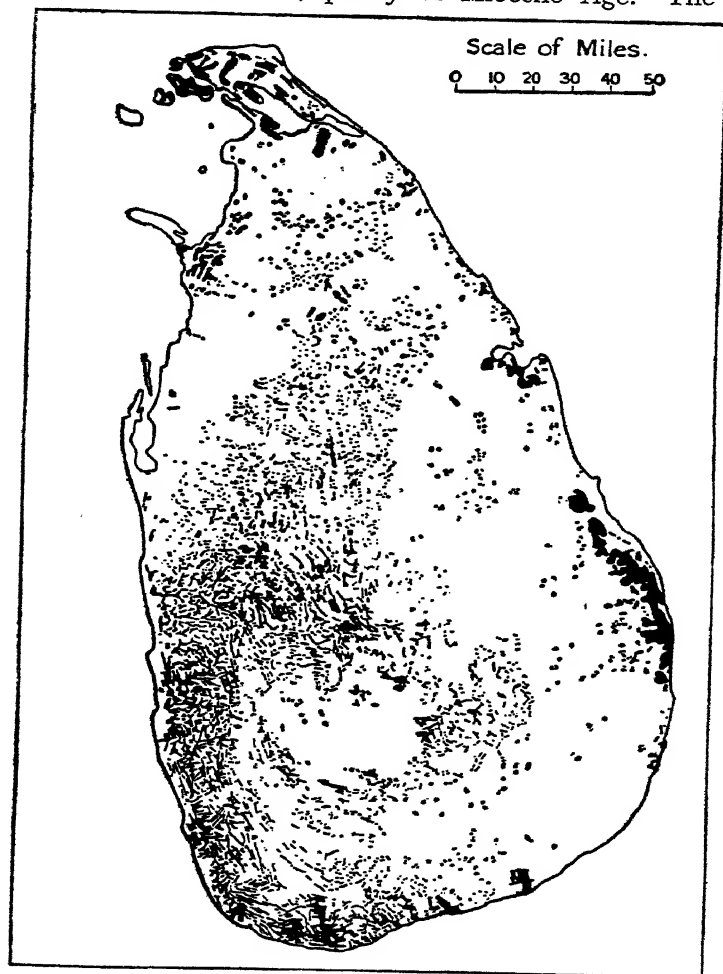


FIG. 198c.—The rice lands of Ceylon.

(Map constructed by A. Ginigé, M.A.)

distinctive part of this very interesting region is the Jaffna Peninsula itself, densely peopled almost exclusively by 'Ceylon Tamils', who cultivate every available acre. In the east are many salt pans and tracts of saline soil on which little will grow

and a thorny scrub covers much of the mainland limestone area. The once important Palmyra palm is giving way to the coconut.

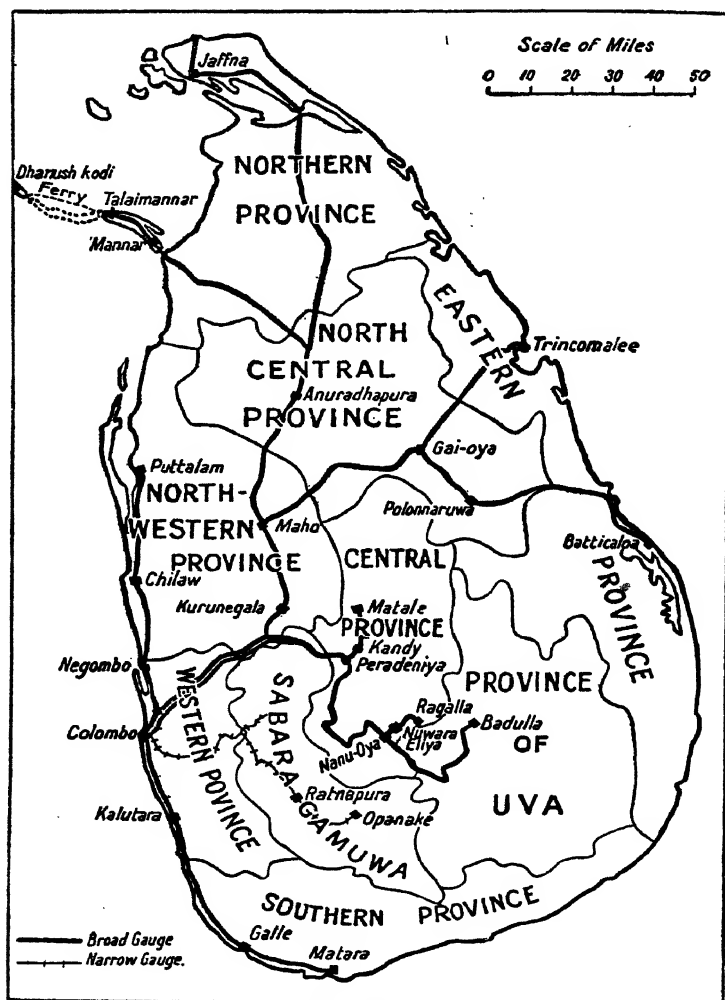


FIG. 199.—The railways of Ceylon.

The mail route from Ceylon to India is through the port of Talaimannar, at the end of the sandy Peninsula of Mannar and the terminus of the Ceylon Government Railways. From Talaimannar daily steamers cover the 22 miles of shallow sea to Dhanushkodi, the terminus of the South Indian Railway.

South of the Mannar Peninsula is the shallow Gulf of Mannar, famous for its pearl fisheries.

**Communications.** The railways of Ceylon are broad gauge (5 feet 6 inches) and are State-owned. Colombo is the natural centre of the railway system. One line runs southwards along the coast to Galle and Matara, whilst the main line runs northwards through the old historical town of Anuradhapura to Jaffna, with branches to Talaimannar and to Trincomalee and Batticaloa. Another line, constructed at great expense and running for a considerable distance high up on the sides of a deep valley, runs from Colombo to Kandy, and winds about amongst the hill country to Badulla. There is a short branch from this line to Nuwara Eliya, and the journey from Colombo to Nuwara Eliya is one of great interest. Ceylon is better served by roads than India, and there are many excellent motor roads which link up outlying places with the railways. Outside Colombo and Galle there are few hotels, but there is a series of excellent Rest Houses, constructed by Government primarily for the use of officials, at which travellers may secure shelter, and, in many cases, food. Perhaps these little details are out of place here, but they mean a great deal to the European resident or visitor. There are few countries which approach more closely the Western idea of the Tropics than does Ceylon, few journeys in the world to surpass for quiet beauty an afternoon train ride to Matara, with the sun setting over the sea within a frame of coconut palms and golden sand, or few memories which will last as vividly as that of exploring the Temple of the Tooth by the light of a flickering candle or of watching the moonbeams amidst the ghostly shadows of the old Dutch Fort at Galle.

**Production and Industry.** Out of about 3 million acres under cultivation, the areas occupied by the principal crops are :

	Acres.
Coconuts . . . . .	1,100,000
Rice . . . . .	850,000
Other Grains . . . . .	104,000
Tea . . . . .	457,000
Rubber . . . . .	534,000
Cacao . . . . .	35,000
Cinnamon . . . . .	25,000

Cattle number nearly  $1\frac{1}{2}$  millions, but there are few sheep.

The distribution of coconuts is shown in Fig. 200, and reference has been made to the methods of cultivation, largely in the hands of natives. The value of coconut products exported in 1926—since when, unfortunately, there has been an almost continuous decline—will give some idea of relative importance :

	Quantity.	Value, Rs.
Coconuts, fresh . . . . .	16,950,000 nuts	1,394,000
Copra . . . . .	2,420,000 cwt.	39,848,000
Desiccated coconut . . . . .	754,000 „	17,276,000
Coconut oil. . . . .	570,000 „	15,489,000
Poonac . . . . .	160,000 „	869,000
Fibre-bristles . . . . .	154,000 „	1,150,000
Fibre-matting . . . . .	303,000 „	928,000
Coir yarn . . . . .	108,000 „	1,831,000
		78,785,000

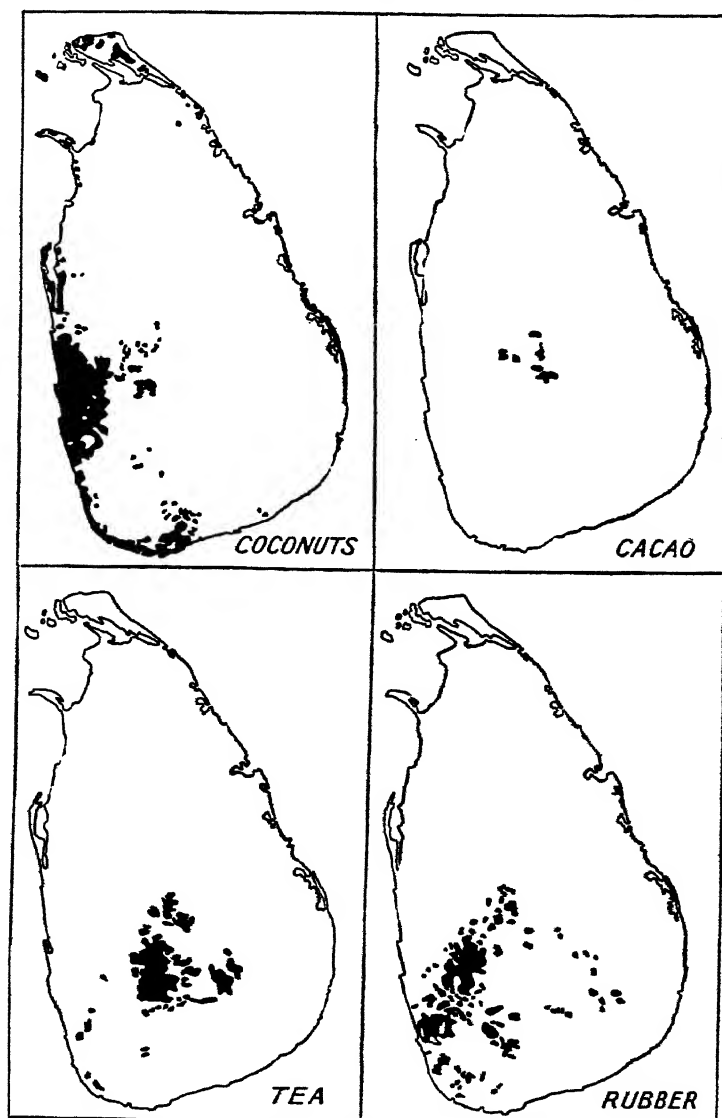
As Rs. 15 = £1, this represents a total value of £5,000,000. This may be compared with a little over 30,000,000 rupees in 1932, though in that year the exports of *oil* were the highest (in bulk) recorded to that date.

As shown in Fig. 201, the tea-gardens of Ceylon are found in the hills, mainly between Kandy and Nuwara Eliya. The quantity of black tea exported normally reaches 200,000,000 lb (annually) and of green tea, 1,300,000 lb.—of a total value approaching £15,000,000 formerly (£7,000,000 in 1932). By contrast to the coconuts, tea is produced on large estates, many of which are owned by large companies. The same is true of the rubber plantations, and in 1926 the value of the rubber exported (£12,000,000) approached that of the tea, although the exports did not represent the full capacity of the plantations. Compare this with £880,000 in 1932. As shown in Fig. 203, the rubber plantations are found on the lowlands and lower slope of the hills, mainly in the south-west. It is necessary to realize the extremely hilly nature of much of this country, and many of the Ceylonese rubber estates are on steep valley sides—well seen in the train journey from Colombo to Kandy. In this respect Ceylon offers a considerable contrast to Malaya.

The cacao of Ceylon is restricted to the region of the hills north-west, north, and east of Kandy. There are two crops—spring and autumn. The total value is about £150,000. The acreage under cacao tends to decline and the replacement of cacao by rubber was a marked feature of the boom years. It is difficult to realize that Ceylon was once famous for its coffee for the crop has practically disappeared, the competition of Brazilian and Javanese preventing a recovery from the epidemic which destroyed the original plantations.

Paddy is the principal food grain of Ceylon, but is not produced in sufficient quantities to satisfy home requirements

There are two harvests, corresponding to the two monsoons, on the vagaries of which the crops depend. In the south-west



FIGS. 200-3.—The distribution of four leading cash crops of Ceylon.

are seen numerous examples of the elaborate hill-terracing so characteristic of the more fertile hill-slopes of Java; in the east and north paddy depends largely on the irrigation from

tanks. In addition to 160,000 acres irrigated by large Government works—nearly 200 in number—there are also 200,000 acres of paddy irrigated by nearly 3,000 village tanks. In addition, a thousand village tanks are being restored.

Reference has already been made to the cinnamon and citronella of Ceylon, both essentially characteristic of the island; cardamoms, papais, areca-nuts, and tobacco are worthy of note, as well as three fibres—sisal hemp, kapok, and cotton, the latter almost entirely from the Hambantota district of the dry south-east.

Manufactures on a large scale are restricted to the preparation of agricultural products—connected with the tea, coconut, rubber and cocoa plantations. Native manufactures are of minor importance commercially, and include the working of tortoise-shell—mainly at Galle; carving, weaving, basket-work, and the cutting of gems.

Special interest attaches to the fisheries of Ceylon. Although the inshore waters abound in both surface and bottom-feeding fishes, the native catamarans and outriggers are not the best type of fishermen's boats; they are too small to carry large lengths of line or net. As a result there is a considerable import of dried fish from Southern India as well as the famous (for its smell) Maldivian fish from the Maldivian Islands. A trawling company started modern fishing operations on the Pedro Bank (off Point Pedro) and Wadge Bank (off Cape Comorin) in 1927. The pearl fisheries of the Gulf of Mannar are under Government control. A 'fishery' is held in certain years only, when it is ascertained that there are sufficient numbers of mature oysters to warrant it. The oysters are retrieved from 5 to 10 fathoms by skilled Tamil divers. The oysters are allowed to rot and the pearls recovered from the washings. There is also a pearl fishery of a different character in the shallow almost landlocked Bay at Trincomalee, known as Lake Tamblegam. Here the 'window-pane oyster' occurs which yields small irregular pearls, in considerable demand locally, though not good enough for the European market. When oysters are present in the lake it is the practice of the Government to lease the fishery for three years. The water does not exceed about 12 feet in depth; in depths up to 5 feet the natives from the surrounding villages pick up the oysters with their toes, diving for them in the deeper parts. In the fishery, which took place between March 3rd and April 13th, 1926, about 2,000,000 oysters were fished. According to the usual custom the divers retain one-third in lieu of pay. Another interesting fishery is the chank fishery of the Palk Strait. Chanks are univalve shells in great demand in India for the purpose of manufacturing bangles, etc., and the huge number of nearly 2½ million are fished annually.



**Foreign Trade.** Figs. 204 and 205 illustrate the foreign trade of Ceylon. The trade is carried on mainly by British vessels. Out of 4,244 vessels of 12,719,600 tons entering Ceylon ports in 1927, 3,097 of 7,670,300 tons were British. Dutch and Japanese reached a total tonnage of nearly 1,000,000 each; French and German roughly 750,000 each. Although the num-

## EXPORTS (1929 - 33)

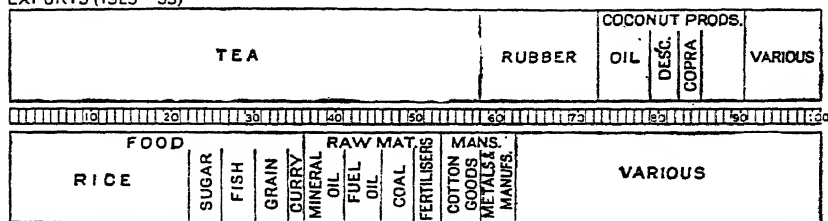


FIG. 204.—The foreign trade of Ceylon.

ber and tonnage have dropped in later years, the proportions have been roughly maintained.

It will be noticed that of the exports roughly 45 per cent. go to the United Kingdom, and nearly 15 per cent. to the United States. Ceylon has three staple exports—tea, rubber and coconut products. Two-thirds of the tea goes to the United Kingdom, second and third customers being Australia and the United States. The United States purchases half of the rubber,

## EXPORTS (1929 - 33)

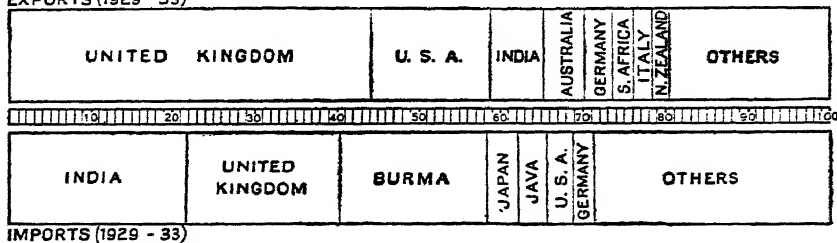


FIG. 205.—The direction of the foreign trade of Ceylon.

the United Kingdom and Germany most of the remainder. Desiccated coconut goes mainly to the United Kingdom and Germany; copra to India, Italy and Australia, and oil to India, the United Kingdom and Holland.

The bulk of Ceylon's imports come from India proper, the United Kingdom and Burma, these three areas supplying 60 per cent. of the whole. Burma supplies the bulk of the rice; India and Australia most of the wheat; the United Kingdom and India most of the cotton goods.

Nearly all the foreign trade of Ceylon now passes through

the port of Colombo. Before the building of Colombo harbour, Galle was the principal port of call. Galle is a fine but small natural harbour and has a dangerous rocky entrance, facing into the teeth of the south-west monsoon. Trincomalee is a British naval base, and is likely to benefit from the recently completed railway, whilst mails for South India go by Talaimannar pier. Otherwise Colombo has almost a monopoly of foreign trade; no less than five berths are available for vessels drawing up to 33 feet; there is a graving dock and patent slip and an oil-fuel depot.

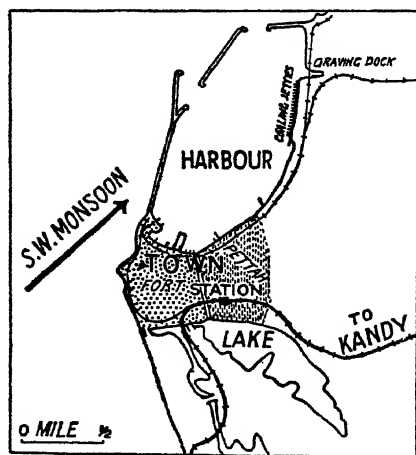


FIG. 206.—A sketch-map of the artificial harbour of Colombo, showing how it is sheltered from the south-west monsoon.

**The Maldive Islands** form a dependency of Ceylon, being situated about 400 miles to the south-west. They are ruled by a Sultan, who pays an annual tribute to Ceylon. The group consists of thirteen coral islands, richly clothed with coconut palms. The people number 70,000; they are Mahommedans and are great fishermen and traders.

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The official *Annual Report* (Colonial Reports, Ceylon) is particularly valuable and contains numerous coloured maps and plates.

Census Publications. Decennially since 1871.

Ceylon is fortunate in having an active Survey Department which publishes not only an excellent series of topographical maps, but others of a special nature.

An important geographical work on *Ceylon*, by Miss E. K. Cook, has recently been published by Macmillan & Co. Ltd. (London), 1931.

## CHAPTER VI

### SOUTH-EASTERN ASIA AND THE EAST INDIES

**T**HERE are two reasons why the peninsulas of South-eastern Asia and the islands of the East Indian Archipelago should be considered, in the first place, as a whole. The first is that there is structural continuity between the principal orographical features of the mainland and the islands; the second is that climatically both Malaya and the East Indies lie in the region of Equatorial climate, whilst the broader peninsula of Indo-China and the Philippine Islands agree in lying to the north of it and to having certain features in common.

Between the populous lands of India and China lies the broad peninsula of Indo-China—divided between Burma, which we have already considered, Siam, and the French sphere of influence, French Indo-China. From this broad peninsula a narrow subsidiary one extends southwards as Malaya. Grouped round these peninsular masses are the now familiar festoons of islands which make up the whole East Indian Archipelago.

Structurally Indo-China<sup>1</sup> has a core of older rocks—varying in age from Pre-Cambrian to Middle Mesozoic, but which were certainly folded before the Tertiary period. This old core, which builds up the Shan States Plateau of Burma, occupies most or all of the Malay Peninsula; it is extended southwards to embrace the little islands of Sinkep, Banka and Belitong and a broad wedge of country in the island of Borneo. This old massif was folded, apparently in the main by Mesozoic earth movements, and long folds have a roughly north-south direction. The mountain system which builds up the massif is often known as the Indo-Malayan mountain system, to distinguish it from the later Tertiary or Alpine mountain systems. The country rocks of the Indo-Malayan Mountains include huge stretches of

<sup>1</sup> See J. W. and J. C. Gregory, 'The Alps of Chinese Tibet and their Geographical Relations,' *Geographical Journal*, Vol. LXI, 1923, pp. 153-179; J. W. Gregory, 'The Banda Arc,' *Geographical Journal*, Vol. LXII, 1923, pp. 30-32; H. A. Brouwer, *The Geology of the Netherlands East Indies*. New York, 1925.

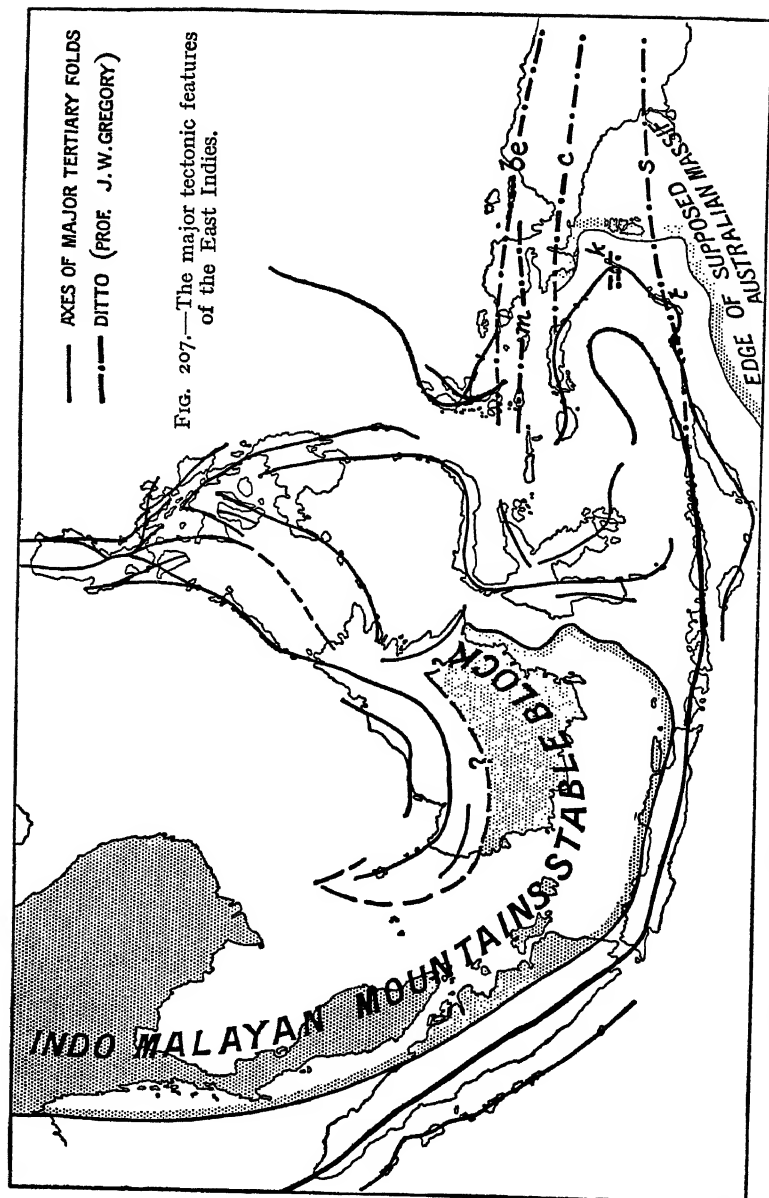


FIG. 207.—The major tectonic features of the East Indies.

In the main after H. A. Brouwer; Philippines after Warren D. Smith. Brouwer and others believe that New Guinea forms part of the Australian massif and that the Tertiary folds end against it as the 'Banda Aro', shown on the above diagram shaped as a fish-hook. Prof. J. W. Gregory considers, however (*Geographical Journal*, 1923), that the main Tertiary folds pass on through New Guinea which is *not* therefore part of the Australian stable block. Gregory's main trend lines are marked: *s*, Sunda line; *c*, Buru-Ceram line; *m*, Sula-Misool line; *be*, Batanta-Jappa line. Obviously the critical areas in the discussion are the Kai Islands (*k*) and Tanimbar Islands (*t*). The lines shown on the above map are not actual geological boundaries.

phyllites or slaty rocks believed to be Pre-Cambrian in age, as well as considerable areas of massive limestone probably mainly Devonian-Carboniferous. Rocks, especially reddish shales,

shown by their fossils to be early Mesozoic in age, are included in the folding, which must therefore have been at least later than their deposition. Of very special interest are the numerous intrusions of granite, now generally believed to be early Cretaceous in age and therefore roughly contemporaneous with the Deccan lavas of India. The granites occur mainly in masses elongated in the direction of the grain of the country—the exposed areas often not exceeding a mile in width but a dozen or more miles from north to south. The importance of these granite masses lies in the association of the famous tin deposits of Siam, Burma, Malaya and the Dutch East Indies, with their peripheries. Broadly speaking, the granites give rise to the higher hills, being more resistant to weathering than the sedimentary rocks.

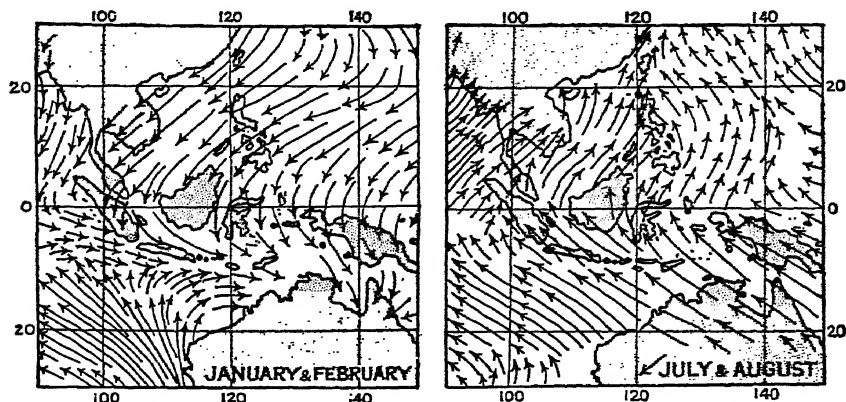


FIG. 208.—The prevailing winds of the East Indies; the length of the arrows is proportional to the constancy of the winds.

(From Kendrew's 'Climates of the Continents', by permission of the Clarendon Press.)

The more important of the younger rocks in the central core are the clays and shales found infilling old lake-basins and which carry sometimes lignite, sometimes oil shale. In Siam alluvium hides large areas of old rocks.

Flanking the central core are the fold ranges of Tertiary mountain systems. The mountain chains themselves are built up mainly of folded sedimentary rocks, in which Tertiary strata are included. Between the ranges and the old core or on the flanks of the ranges, are areas occupied mainly by slightly folded sediments of Tertiary Age. It is in these latter areas that are found the oilfields of Burma, Sumatra, Java and Borneo. The oilfields themselves are usually anticlinal pucks in the basins of Tertiary sediments. Although several of the mountain chains have central cores of ancient metamorphic rocks, the

place of the granite intrusions of the Indo-Malayan Mountains is taken by rather minor intrusions—especially of serpentine and basic igneous rocks—and by extrusive masses. Indeed volcanoes, both active and extinct, are characteristic of the Tertiary fold lines or their flanks throughout the East Indies. An excellent example is afforded by the stately succession of volcanic piles which render Java such an extraordinarily beautiful land. No one after a night trek from the hill station of Tosari could forget the thrill of watching the dawn gradually illumine the wonderful series of peaks which frown down upon the yawning, rumbling crater of Bromo; whilst only Fujiyama can be held to surpass in beauty the perfect symmetry of Meröe.

Although broadly the whole of Malaya and the East Indies lies in the Equatorial belt, the details of the climate vary with position relative to the Equator or with local physical conditions and will be considered under separate divisions.<sup>1</sup> Further, the community of physical structure in South-eastern Asia is not reflected in its human and economic geography: its constituent parts offer some extraordinary contrasts. The dense population and high economic development of Java contrast curiously with the undeveloped and almost unknown interior of Borneo and New Guinea.

### MALAYA

The Malay Peninsula, or Malaya, forms the south-eastern extremity of the mainland of the continent of Asia. The sphere of British influence, to which the term Malaya is commonly restricted, extends from the island of Singapore (Lat.  $1^{\circ} 20' N.$ ) to a point to the north in Latitude  $6^{\circ} 40'$ , where it abuts on Siamese territory. Geographically the Peninsula extends further to the north, embracing a considerable tract of Siam. The narrowest part of the isthmus, the Isthmus of Kra, is in Latitude  $10^{\circ} N.$ , and it is here that the southernmost part of Burma is reached.

**Physical Features.** In general the relief is diversified and there are few large areas of flat land, though extensive tracts of low undulating land exist. The main mountain divide lies nearer the west coast than the east. Several parts rise to over

<sup>1</sup> The complexity of rainfall conditions in the Archipelago may be gathered from the fact that Dr. Boerema, in a recent publication of the Meteorological Observatory at Batavia (*Verhandelinger*, No. 18), distinguishes sixty-nine rainfall 'types' in Java and Madura and eighty-six in the other islands. A very thorough study of the climate has been made by C. Braah, *Het Klimaat van Nederlandsch-Indië* (in English and Dutch), Batavia, 1923, in 3 vols.

7,000 feet. Gunong Tahan is 7,184 feet, Mount Kerbau or Gunong Korbu reaches 7,160 and Mount Hulu Temengor 7,020 feet. Towards the north the main range is cut across by the valley of the Perak River and towards the Siamese border becomes indistinct. West of the Central Range the country is undulating, fertile and extensively developed. East of the range there is an extensive mass of wild, forested mountains and the country is less developed than on the western side. The contrast between the eastern and western sides of the peninsula is reflected in the tracts of water on either side. On the east coast is the South China Sea, a tract of water so stormy in the period of the north-east monsoon that communication is difficult despite the existence of several river mouths as harbours. On the west coast lie the tranquil Straits of Malacca and, 60 to 100 miles away, the shores of Sumatra. In the past, just as is the case to-day, human life and movement have been concentrated on the western side of the peninsula.

Geologically Malaya belongs entirely to the central core of South-eastern Asia, to which reference has been made above, and so offers a marked contrast to Sumatra and Java. The large intrusive masses of Mesozoic granite form the mountains of the main ranges, but certain of the very rugged mountains of the east are formed of quartzite and shales—the Pahang Quartzites—but on the east coast granite appears again. On the west of the peninsula are certain remarkable masses of limestone—remarkable because of their vertical sides rising to heights of many hundreds of feet. Many of these masses are riddled with fascinating natural caves. Most of the rocks of the valleys are shales of doubtful age, though including strata at least as young as Middle Mesozoic. There are ancient volcanic rocks—the Pahang Volcanic Series—but none of such recent date as there are in Java. Although only three or four small patches of Tertiary rocks, occupying basins, are known to occur, they are interesting as carrying seams of coal. The basin at Rantau Panjang in Selangor is sufficiently extensive and the seams are sufficiently important to supply all the coal needed by the railways of the peninsula. The inland alluvial deposits of the valleys are the source of most of the tin ore found in the country; in places gold also is found, sometimes gold alone. On the east coast there are few stretches of flat land. On the west coast, sheltered by Sumatra, and not exposed to strong winds or heavy seas, there are considerable alluvial plains and extensive mangrove swamps. Some of these lowlands are formed by alluvial deposits washed down by the rivers, others are due to the denudation to base level of the softer tracts of shale.

Reference has been made above to the 'main mountain divide' of Malaya. Actually there are a number of ranges or 'coulisses' placed *en echelon*, as shown in Fig. 209. (See J. B. Scrivenor, 'The Physical Geography of the Southern Part of the Malay Peninsula,' *Geographical Review*, Vol. XI, 1921, pp. 351-371.)

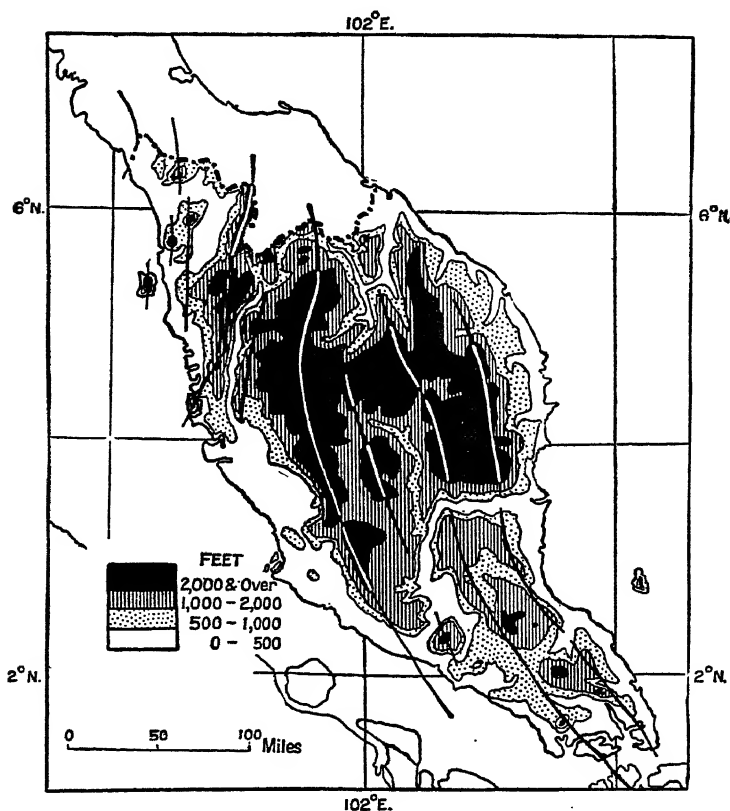


FIG. 209.—A physical map of Malaya showing the coulisses (in white or black lines) recognized by Scrivenor.

The climate of Malaya favours the formation of laterite, which consequently occurs over wide areas.

**Climate and Vegetation.** Malaya lies entirely north of the Equator, with the result that although the climate is Equatorial and the rainfall well distributed throughout the year, there is an increasing tendency as one goes northwards for a rainfall maximum to be marked and for a 'dry season' to develop. Really it is only possible to separate two seasons—a



wet and a wetter. This is well seen by contrasting the figures for Singapore with those of Penang. On the west coast the 'wet season' corresponds with the period of the Indian monsoon. On the other hand, the east coast is under the influence of the north-east monsoon and has a definitely wet and stormy season between November and March.

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Singapore :													
Temp. in ° F. . .	78.3	79.0	80.2	80.8	81.5	81.1	81.0	80.6	80.4	80.1	79.3	78.6	—
Rainfall in inches .	8.5	6.1	6.5	6.9	7.2	6.7	6.8	8.5	7.1	8.2	10.0	10.4	92.9
Penang :													
Temp. in ° F. . .	79.7	80.1	81.3	81.7	81.5	80.6	80.2	79.9	79.5	79.7	79.2	78.8	—
Rainfall in inches .	3.9	3.0	4.7	7.0	11.0	7.2	8.9	12.8	19.0	16.1	10.9	4.8	109.3

The average rainfall of Malaya may be said to be rather over 100 inches. In some exposed situations it rises to 270 inches ; in some sheltered valleys it drops to 60 inches.

In general the climate of Malaya is hot and humid throughout the year. It is essentially monotonous—never cold, but never excessively hot, with scarcely any appreciable seasonal variations except perhaps on the east coast. It has been truly remarked that the climate of Malaya is a healthy and delightful one for those in good health, but it kills by its very monotony ; it affords no chance of recuperation for those who are 'run down'. It is curious how susceptible to slight changes of temperature one can become after living in such an atmosphere. Owing to the high humidity thick, damp fog is common between six or seven and nine or ten in the morning, and the air seems chilly despite a temperature of about 75° or more. Later the sun breaks through and the heat may seem very intense, although the thermometer rarely registers any temperature over 90°. In the afternoon the formation of clouds and a downpour of convectional rain, sometimes with thunder, are common ; the rainfall usually coincides with the hour otherwise consecrated by Europeans to a game of tennis or a round of golf.

The natural vegetation of Malaya is essentially lofty ever-green forest. Forest in general extends from the top of the highest ranges—elevation does not seriously affect the character of the vegetation until the 5,000-foot contour<sup>1</sup> is passed—to the seashores. Here and there its continuity was—and still is—interrupted by special associations of plants. The most noticeable of these special associations are the mangrove swamps of the flat west coast—trees specially adapted to enable them to

<sup>1</sup> Above 2,000 feet there is, however, a change in the species, and the forest is lower.

draw moisture from a soil impregnated with salt water and thus 'physiologically dry' to most plants. An essential characteristic of most mangroves is the presence of aerophores—vertical peg-like projections from the roots into the air which permit the breathing or aeration of the root tissues except during the two periods of the day when the tide covers the soil of the swamps. The common trees of the mangrove swamps number about half a dozen—*Bruguiera*, *Heritiera* and *Rhizophora* are the principal genera. On the sandy strands of the east coast a narrow band of the graceful feathery *Casuarina* trees is a common feature. On the higher ranges the forest becomes sparser and the quartzite ranges of the east are almost devoid of trees.

Elsewhere, where man has not interfered with it, the forest holds undisputed sway. Equatorial forests are frequently described as gloomy and vault-like, with a lifeless floor to which sunlight never penetrates. Not so the delightful forests of Malaya. True, the dense crowns of foliage make a continuous canopy through which shafts of sunlight penetrate but occasionally, and are all the more fascinating because of their rarity. The trees are of many species, rarely gregarious, growing close together, tall, straight and unbranched, generally supported by plank buttresses at the base. Members of the great family of the Dipterocarpaceæ predominate among the larger trees, averaging 150 feet in height, but the number of species of trees in Malaya alone exceeds that in the whole of India. Then there is a lower storey of shade-loving trees, 20–50 feet in height, and a ground storey of shrubby trees, bamboos, canes, large-leaved herbaceous plants, mosses and ferns. Far from being devoid of vegetation the ground is usually very well covered. On and among the trees are a host of epiphytes (especially ferns) and climbers, whilst a striking feature of the forests is the mass of fallen coils of the woody lianes. The atmosphere within the forest is humid and still, so quiet very often as to be sinister, for the animal life is concentrated in the tree-tops above. In such an atmosphere the leaves and fallen branches disintegrate quickly and form a deep rich mould—a perfect home for saprophytes of all kinds.

In its natural form the forest furnishes little which is of immediate use to man.<sup>1</sup> Few of the plants furnish fruits of

<sup>1</sup> The chief minor products are canes (rattan or rotan and malacca canes), gutta percha (from the tree *Palaguium oblongifolium*, now rare in the peninsula), damar (obtained by tapping certain dipterocarps) and jelutong (an exudation product from trees of the genus *Dyera*, now in demand in the United States for the manufacture of chewing gum).

roots which are nourishing as food, and not a small number are poisonous; the trees are hardwooded and difficult to clear with primitive implements; land which has been laboriously cleared soon becomes covered with a growth of rank grass (the 'lalang' of the Malays) and then by forest 'weeds'. Primitive man wages an unequal struggle against Nature; even though he succeed in keeping his little clearing free, a heavy downpour may wash his crops from the ground and the very soil from his plot. It is small wonder that the forests of Malaya are inhabited by the primitive backward Semang; the Malays have

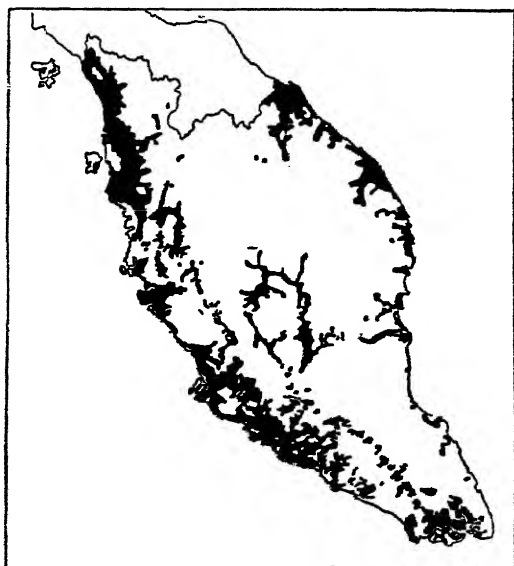


FIG. 210.—Cultivated land in Malaya (cultivated land in black).

This map emphasizes the concentration of cultivation towards the coasts and stresses the greater development of the western side of the peninsula.

concentrated along the west coast valleys where paddy can be grown, but even there they have been forced by the climate to a position of cheerful but indolent *laissez-faire*; it is the vigorous new-comers with the richer blood engendered by a cooler climate who have effected the economic development of Malaya.

**Agricultural Development.** 'The country is extremely fertile, and fertility, though a bad master, makes a splendid servant for a wise and competent humanity. Not only is the forest a huge store of timber and other valuable products, but

the soil won from it is admirable for all ordinary tropical crops Tickle the fertile soil and it laughs.' <sup>1</sup>

The three chief agricultural crops in the peninsula are rubber coconuts and rice or 'padi'. Rubber is the great plantation crop and the plantations are largely under European management; some progress has been made in the organization of coconut plantations along comparable lines, but to nothing like the same extent; the cultivation of padi is essentially in the hand of Asiatics. Agriculture, other than the cultivation of these three crops, consists of 'mixed farming', almost entirely in the hands of Chinese and Malays. Near all important centres of population Chinese market gardens are found which supply vegetables to the local markets. The Chinese have brought with them their own methods of agriculture—fully discussed in another chapter—and have been pioneers in the cultivation of several crops, notably pine-apples, tapioca, gambier and pepper. The Malays lack the organizing power and the industry of the Chinese. Malayan native agriculture is restricted to the cultivation of rice, the production of native fruits—many of which are but the product of the local trees—and the careless rearing of a multitude of minor crops, including spices, tobacco, coconuts and fibres.

A factor which enters largely into agricultural practice is the danger of soil erosion. Flat land is comparatively free from this danger, but on hill-slopes and undulating land it is ever present. Once the surface layer, rich in humus and plant food, is removed, it is doubtful whether anything can restore the original fertility of the soil. The ground must never be ploughed over large areas or completely cleared of weeds—so that European or American methods of agriculture are totally unsuitable. Perhaps the best method of preserving the soil is the growing of a 'cover crop', especially a leguminous crop which will add valuable nitrates to the soil. Weeding in strips or circles, digging of catch pits, bending and terracing are other methods of nullifying the erosive action of the heavy rains.

*Rubber* is the chief agricultural product of Malaya. The romance of the introduction of rubber from South America to the East has often been told.<sup>2</sup> 70,000 seeds were rushed by specially chartered ocean liner from the Amazon to England

<sup>1</sup> A. R. Wheeler, *The Modern Malay* (London, Allen & Unwin, 1928).

<sup>2</sup> An interesting brochure, entitled 'Rubber Planting in Malaya', is published by the Malay States Information Agency, London. A full treatment is given by D. M. Figart, 'The Plantation Rubber Industry in the Middle East', *U.S. Dept. of Commerce, Trade Promotion Series*, No. 2, 1925.

in 1876 and 2,800 plants were successfully reared in the Botanical Gardens at Kew. A consignment of nearly 2,000 plants was sent to the Botanic Gardens at Peradeniya in Ceylon, but it was not until the next year that seedlings from Ceylon were successfully established in Malaya. The low price of rubber and the continuance of supplies from Equatorial Africa prevented any interest being taken in the new culture, and it was not until 1895 that any rubber was planted as an estate culture on a large scale. At first progress was slow and it was difficult to persuade planters of the value of the new crop. In 1905 rubber plantations occupied, in the four states of the Federated Malay States, about 40,000 acres; this was increased to 250,000 in 1910, 500,000 in 1915, and 780,000 in 1920. At the end of 1925 the total area under rubber in the whole of British Malaya was about 2,250,000 acres.<sup>1</sup> The approximate net export of rubber from British Malaya rose from about 6,500 tons in 1910 to 68,000 in 1915 and after as follows:

1916 . . . .	96,000	1926 . . . .	286,000
1917 . . . .	127,000	1927 . . . .	242,000
1918 . . . .	114,000	1928 . . . .	409,000
1919 . . . .	204,000	1929 . . . .	577,000
1920 . . . .	181,000	1930 . . . .	554,000
1921 . . . .	151,000	1931 . . . .	518,000
1922 . . . .	213,000	1932 . . . .	406,000
1923 . . . .	201,000	1933 . . . .	445,000
1924 . . . .	183,000	1934 . . . .	465,000
1925 . . . .	210,000		

The rubber 'boom' lasted till 1919. The effect of world-wide depression was first felt in the rubber industry in October, 1920, when the price fell to 52 cents per pound in Singapore.<sup>2</sup> The following June, the price was down to 25 cents. Over production relative to the purchasing power was the obvious cause; restriction of output an obvious remedy. At that time Malaya and Ceylon were producing about three-quarters of the world's rubber and virtually in a position to control world prices. In November, 1922, the Stevenson Restriction Scheme came into effect. The scheme allowed the export of a definite proportion of 'standard production', varying with the price ruling for the previous quarter. 'Standard production' was defined as the quantity of dry rubber produced from any holding during the period November 1st, 1919, to October 31st, 1920. The price of rubber rose immediately from 9d. to 1s. 4d. per pound, and for several years was maintained at about 1s. 3d. per pound. In the meantime, however, plantations in the Dutch East Indies and elsewhere, not subject to the restriction, came into bearing, and, as shown in the diagram below, supplied a larger and

<sup>1</sup> But had increased only to 3,075,000—half of which was mature—by 1933.

<sup>2</sup> Straits Currency \$1 or 100 cents = 2s. 4d.

larger proportion of the world's requirements. The time for the removal of the restrictions to meet this competition was generally held to have arrived and from November 1st, 1928, the production became free.<sup>1</sup>

Rubber and tin made possible Malayan development. Immense areas of dense uninhabited forests were converted into flourishing plantations, a vast army of Tamils, Chinese and Malays employed on land previously useless, the revenue derived from the industry was wisely used in providing Malaya with a system of metalled roads and railways unrivalled in the East—solid assets which the depression could not touch.

The forest is cleared by felling the large timber trees and burning off all that remains. It seems a terrible waste of valuable firewood, but the value of that commodity does not

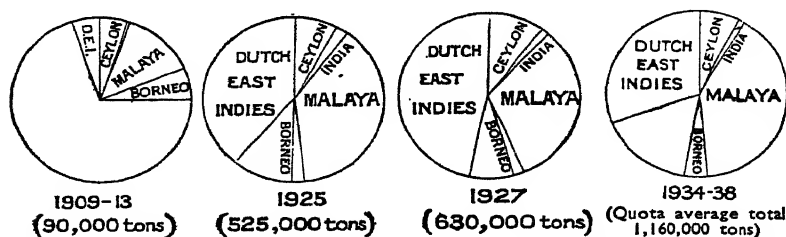


FIG. 211.—Shares of British (the four divisions on the right of each circle) and Dutch Asia (on the left) in the total rubber production of the world.

Total production in 1934 about 1,000,000 tons.

at present warrant its removal. The extraction of the great stumps of the forest trees is a difficult and expensive matter; they are often left in the midst of the plantations to rot. As soon as the burnt area commences to recover, weeds spring up and grow with incredible rapidity. The use of cover crops to fight the weeds has taken the place of clean weeding for reasons already noted. More and more attention is being given to careful selection of trees for planting: 100 to the acre on ground completely cleared of stumps is a standard number, but thinning takes place later and half that number is the ideal in the twelfth year. In Malaya, owing to climatic conditions, there is a steady flow of latex throughout the year. The latex is in the bark of the tree; hence a thin slice is cut off the bark. Various systems of 'tapping' are adopted; the general one now is to cut half way round the circumference of the tree every other day. The latex drains into a little glazed earthenware cup, and an hour

<sup>1</sup> The price actually dropped below 4d. per lb. in 1930-31 with very serious results to the industry in Malaya. Drastic efforts to reduce production costs followed and the larger companies weathered the storm. A new international agreement to regulate production and export came into operation on June 1st, 1934 (for five years).

or so after tapping the coolies collect the latex in pails. The coolies for this work are usually Tamils from South India<sup>1</sup>; one coolie looks after 300-400 trees and is usually paid in proportion to the weight of the latex brought in. The latex is diluted with water at the 'Store', coagulated by the addition of acetic acid. The coagulated latex is then machined into 'sheet' rubber or long strips of crêpe, washed, drained and smoked or dried. It is exported mainly as 'smoked sheet' or crêpe.

*Other Crops.*<sup>2</sup> The space devoted to Rubber in this section is justified by its paramount importance in Malaya. The chief cereal crop—indeed, the only cereal crop of importance—is rice. Rice is the staple diet of 99 per cent. of the population, yet Malaya produces only about a third of the total consumed and only 16 per cent. of the population are engaged in rice cultivation. Rather under 700,000 acres are under rice (compare rubber), equivalent to only 0.2 acres per head of population. The only self-supporting States are Kedah, Kelantan and Perlis—States in which Malays predominate. Ninety per cent. of the rice is grown by the 'wet' method of cultivation: 'The land is either ploughed or dug over and the weeds are incorporated with the soil. Following this, water is run on to the land, which is then puddled by buffaloes or by rolling, raked free of weeds, and finally brought to a consistent muddy condition for planting seedlings.' In very soft areas ploughing is dispensed with. In dry cultivation, where land is cleared by frequently burning the bush, the seed is sown in holes or sometimes broadcasted. The crop depends on rainfall and the yield is lower than in wet cultivation. It seems curious to talk of 'irrigation' in a wet country such as Malaya, but rice cultivation is most successful with a careful controlled water supply, such as is carried out in those areas of which Krian (70,000 acres) is the chief. Coconuts thrive well throughout Malaya, but especially in the coastal districts of the west. The African oil palm has been introduced into Malaya and a few thousand acres planted. Amongst fruits, pine-apples are important, especially in the island of Singapore. The canning industry is in the hands of a strong Chinese combine, formed in 1926 by the union of the eight Chinese-owned canning factories, with the object of securing uniformity in grading, packing and quality. The exports of tinned pineapples in recent years have been:

<sup>1</sup> In 1920-22 about three-quarters of labourers on estates in the F.M.S.—mainly rubber estates—were Tamils; one-sixth Chinese; 3 per cent. Javanese; 4 per cent. others.

<sup>2</sup> See *Malayan Agriculture*, 1924, Handbook, compiled by the Department of Agriculture, F.M.S. and S.S., 2nd Edition.

1925 . . . . .	43,000 tons	1930 . . . . .	58,000 tons
1926 . . . . .	40,000 „	1931 . . . . .	60,000 „
1927 . . . . .	40,000 „	1932 . . . . .	58,000 „
1928 . . . . .	46,000 „	1933 . . . . .	60,000 „
1929 . . . . .	59,000 „	1934 . . . . .	67,000 „

In 1934 the United Kingdom absorbed 77 per cent. of the exports, and British possessions 18 per cent.

Pines thrive on poor soil—rich soils produce larger fruit but with a poorer flavour. The 'Queen' pines, grown for canning, are very small (3 to 5 lb.), but very sweet. The plants are propagated from suckers at the base of the fruit and are planted in rows 5 feet apart, the plants being  $2\frac{1}{2}$  feet apart in the row. Apart from fruits for local use, bananas and limes might be grown as cash crops. Several fibres are well suited to Malayan climatic conditions, but are little grown; the same is true of sugar-cane, tapioca, coffee, tobacco and the spices for which Malacca was once famous.

Amongst animals water-buffalo are mainly used for paddy cultivation; large numbers of cattle are imported from India and Siam for draught purposes.

**Mining.**<sup>1</sup> Mining in Malaya is virtually synonymous with tin-mining. Reference has been made to the successful mines at Rantau Panjang in Selangor and also to the occurrence of gold. Monazite is also found; phosphate or guano obtained from the bat-infested caves of the limestone country (the most objectionable feature of exploring the fascinating caves of Malaya is the appalling stench, as one is often compelled to tramp ankle- or even knee-deep in bat-guano); whilst chin clay occurs in many places and is successfully exploited for the manufacture of the little cups used in the rubber plantation. Apart from these, tin is the great mineral. Chinese records show that it was known and worked in the fifteenth century; the Dutch in the seventeenth and eighteenth centuries attempted to monopolize the output of Kedah and Perak. Towards the end of the eighteenth century the annual output from Perak was estimated at 5,000 pikuls (300 tons), the bulk of which was won by Malays in Kinta and Batang Padang. 'The discovery of the rich tin fields of Lamit, however, was the main cause of the exploitation of Malaya for tin, and the faction fights which took place between the various clans of Chinese in the 'seventies led to British interference, and so eventually was evolved the present administration' (Greig).

<sup>1</sup> See the instructive pamphlet, *Mining in Malaya*, published by the Malay States Information Agency, London, 1924. A technical treatise is J. B. Scrivenor's *Tin Mining in Malaya* (London, Macmillan, 1921).



Nearly all the tin mined in Malaya is alluvial tin; lode mining for the mineral *in situ* is still in its infancy. The ore is the oxide, cassiterite. In the detrital gravels, derived from the disintegration of granite and the country rocks, the tin ore usually occurs as rounded fragments varying in size from that of a pea to the finest sand. The richest deposits are found in the valleys of the west of Malaya, where the granites border the limestones and other rocks. In a valley filled with the gravel wash the heavy tin is usually found concentrated in the lower layers of the superficial deposits, often in pockets in the underlying bed rock. Frequently a great thickness of useless 'overburden' has to be removed, and this is an important factor in the cost of mining. The tin-bearing gravel is then removed by hand labour with trucks and rails (as in most European-owned mines) or by coolies shovelling the gravel into baskets which are carried to the washing sheds (as in many Chinese-owned mines). The gravel may also be pumped out, together with large quantities of water, by means of gravel pumps, or a great jet of water may be turned on to the deposit and the soft gravel washed out of place ('hydraulic mining'). It will be noted that in all cases the tin is worked in open-cast workings and not in underground mines. Tin ore is very heavy and so can be removed from the light gravel by washing in 'concentrating sluices'. The 'tin concentrate' is sent to Singapore for smelting. Another important method of working in flat alluvial valleys in such a wet land as Malaya is by dredges. A pit is excavated in which the dredge will float; it then eats away the rich ground in front of it, sorts out the tin and dumps the waste behind. It is important to note that ground which has been 'worked over' in this way is available for agriculture. Considerable quantities of tin ore—about 5 per cent. of the total output in 1921—are won by the age-old method of panning. Most of the work of this kind is done by women, especially by Tamils. Whilst most of the tin of Malaya is alluvial tin from the west of the peninsula, tin ore is known to exist in lodes to the north and east, and development may be expected there in the future. Between the years 1900 and 1908 Malaya produced roughly 50,000 tons annually, representing between 50 and 56 per cent. of the world's total. A steadily increasing output from Bolivia forced down Malaya's share in the world's production. From 1909 to 1916 production ranged between 43,850 tons and 50,000 tons, representing between 36 and 46 per cent. of the world's total; from 1917 to 1922, with a production ranging from 34,500 tons to 40,000, Malaya's share was 30 to 33 per cent. A production of 53,000 tons in 1931 was followed by 28,000 in 1932, due to

a quota agreement. The tin ore from the mines is bagged, to a local buyer (who may be a Chinese), or to one of the great smelting companies. With the exception of about 12 cent., smelted locally, all the ore finds its way to the big smelters of the two companies in Singapore and Penang. 'Straits' tin is refined to an average of 99.9 per cent. pure and has properties which render it the best of all tin in the tin-plate industry.

**Political Divisions.** So far we have considered the Malay Peninsula or Malaya as a whole, though reference has been made to the 'Federated Malay States' and to the 'Straits Settlements'. The British sphere of influence in Malaya is divided into three distinct units:



FIG. 212.—Political map of Malaya.

- (a) The Straits Settlements, a British Crown Colony.
- (b) The Federated Malay States (F.M.S.) of Perak, Selangor, Negri Sembilan and Pahang.
- (c) The Unfederated States of Johore, Kedah, Perlis, Kelantan and Trengganu.

The *Straits Settlements* comprise a number of isolated tracts of land in and near the Malay Peninsula and include Malacca, the Dindings<sup>1</sup> and Province Wellesley on the mainland, islands of Penang and Singapore, as well as the more distant Cocos Islands, Christmas Island and the colony of Labuan off the island of Borneo. Malacca is one of the oldest European settlements.

<sup>1</sup> Retroceded to Perak, February 16th, 1935.

in the East, having been founded by the Portuguese in 1511, held by them from 1511 to 1641, by the Dutch from 1641 to 1824, when it passed into the hands of the English. Penang was a depot of the British East India Company, founded in 1786. Singapore was of little importance when it was obtained by the British from the ruler of Johore in 1819, though it is said to have been a place of note before its destruction by the Javanese in 1377. Malacca, Penang and Singapore were incorporated under one government in 1826 and under the control of the East India Company. In 1867 they were separated from India and made a Crown Colony, administered by the Secretary of State for the Colonies in London. The settlement of Penang was afterwards made to include a portion of the opposite mainland—only 2 miles distant—known as Province Wellesley, as well as the island of Pangkor, which, with the neighbouring strip of the mainland, is known as the Dindings. The Cocos Islands were placed under the Government of the Straits Settlements in 1886, Christmas Island in 1889 and Labuan in 1907.

The total area of the Colony is about 1,250 square miles, with a population in 1931 of 1,114,015 persons. The two important parts are Singapore Island (217 square miles, population about 515,000) and Penang Island (108 square miles, population about 183,000). Amongst the population Chinese predominate, and there are large numbers of Indians. The essentially rural Malay is not conspicuous either by numbers or activity. Every year large numbers of Chinese coolies arrive from Canton and other parts of China. In 1923 alone the Chinese immigrants numbered 132,886.<sup>1</sup> Many of these Chinese immigrants settle permanently and many have become very successful merchants. The Indian immigrants in the same year numbered 49,502 and the Indians supply most of the labour in the rubber plantations.<sup>2</sup> The Indian coolie does not seem capable of rising in the same way as the Chinese, and the Indian shopkeepers, though numerous, are of a different type. The transitory nature of much of the population accounts for the fact that males to females are in the proportion of 5 to 3. There are roughly 9,500 Europeans in the Straits Settlements.

The Straits Settlements are administered by a Governor (who is also High Commissioner for the Federated Malay States and for Brunei), assisted by an Executive Council of nine members. There is also a larger body called the Legislative Council of twenty-six members, half being officials and half non-official.

<sup>1</sup> Wide fluctuations in recent years have been caused by unsettled conditions in China (which encourage emigration) and economic depression in Malaya (which causes the Chinese to return to China). Malaya as a whole suffered a loss of 425,000 in 1930-33 but a net gain of 100,000 in 1934.

<sup>2</sup> Numbers greatly reduced during the depression.

The island of Singapore<sup>1</sup> lies at the southern end of the peninsula, from the mainland of which it is separated by the narrow Johore Strait, only about a mile wide. The town and port of Singapore is on the south side of the island, separated from the Dutch islands of Bintang, Batam and Bulang Besar by the Strait of Singapore. The island itself is 27 miles long, 14 miles wide from north to south. The south-west of the island is hilly, but to the east is flat and sandy or marshy. Most of the island is cultivated, being occupied by rubber plantations and coconut groves (the latter on the lower, more sandy ground) and by market gardens supplying vegetables for local con-

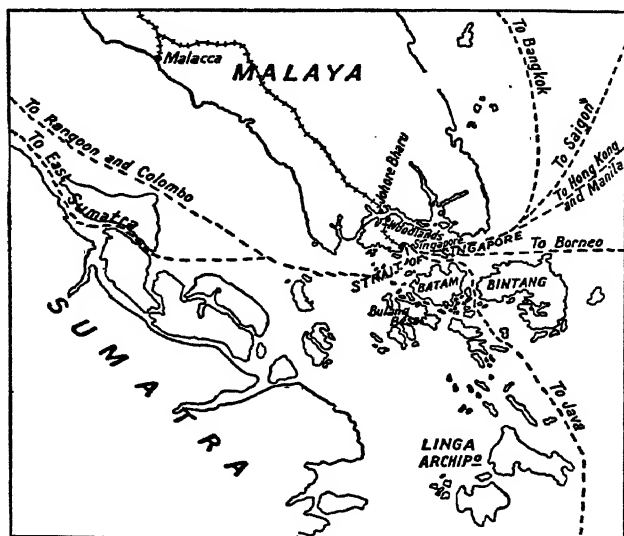


FIG. 213.—The position of Singapore.

The railway is actually continuous between Woodlands and Johore (by a causeway), but has been broken on this map to make clear the position of the strait separating Singapore island from the mainland.

sumption. The British owe the possession of this valuable island to the genius of Sir Stamford Raffles, who purchased it in 1819 from the Ruler of Johore for the sum of 30,000 dollars. At that time it was almost uninhabited. It owes its importance mainly to its position at the meeting of the world's great trade routes from east and west, at the same time being favoured with a magnificent anchorage. It is the seat of government of the Straits Settlements. The Johore Strait, though narrow, is deep in the eastern part, and a naval base for the British

<sup>1</sup> On the strategic position of the island, see Vaughan Cornish, 'Singapore and Naval Geography,' *United Empire*, August, 1925, pp. 500-512.

Admiralty is now being built on this side of the island. A railway runs across the island from Singapore to Woodlands and is connected with the Federated Malay States Railway by a causeway across a shallow part of the Johore Strait.

The smelting of Malayan tin ore is carried on and also the purification of rubber. Singapore has roughly three-quarters of the total trade of the Straits Settlements. Penang is a pretty rocky island rising to over 2,000 feet in the centre. The central part is still forested, but on lower ground are numerous rubber and coconut plantations. The principal town, officially named Georgetown, though always known as 'Penang', faces the mainland and the narrow strait forms a sheltered harbour. On the mainland is Prai, the terminus of the Federated Malay Straits Railways and affording through communication with Singapore in less than twenty-four hours and with Bangkok in less than thirty-six hours.

Malacca is now of small commercial importance, though of great historical interest. A number of old buildings remain to remind one of its former glories.

All the Straits Settlements ports are 'free ports', free from Customs duties. Although there are extensive rubber and coconut plantations on the islands of Singapore and Penang, the main function of the Straits Settlements is to collect and distribute not only the products of the whole peninsula but of a large part of the East Indian Archipelago. Much of the huge trade is thus an entrepôt trade.

The Cocos or Keeling Islands lie about 1,200 miles south-west of Singapore. They are coral islands, about twenty in number, with 1,100 people and extensive coconut plantations.

Christmas Island lies 700 miles east of the Cocos Islands. It has about 750 inhabitants, mostly engaged in working the valuable phosphate deposits for which the island is famous. Its area is rather over 60 square miles.

Labuan is a small island, less than 30 square miles in area, with about 7,500 inhabitants, and lies about 6 miles off the coast of Borneo.

*The Federated Malay States* are native Mahommedan States under British protection. The Governor of the Straits Settlements is *ex officio* High Commissioner. Each of the four States is ruled by its Sultan, who is advised by a British Resident. Negri Sembilan is really a complex State formed by the union of nine small States in 1889, Sungai Ujong joining the union in 1895. British protection dates from 1874, when Residents were appointed to Perak, Selangor, and Sungai Ujong. The federation dates from 1896, when a treaty was made between

the British Government and the four protected States. The supreme authority in each State is the State Council, consisting of the Sultan, the Resident, the Secretary to the Resident and a number of the Malay chiefs and leading Chinese merchants. Matters common to the four States are dealt with by the Federal Council, formed in 1909. This Council consists of the High Commissioner, the Chief Secretary, the four Sultans and the four Residents, two special advisers and eight unofficial members.

The areas and populations (1933) of the States are:

Perak . . . . .	7,800 square miles	713,139
Selangor . . . . .	3,156 " "	490,635
Negri Sembilan . . . . .	2,500 " "	218,590
Pahang . . . . .	14,000 " "	175,406

Out of the total population of 1,597,770 there are no less than 494 males to every 300 females. This anomaly is due to the large numbers of Indian and Chinese immigrants, mostly of the coolie class, who do not bring their womenfolk until they settle permanently. The racial proportions are:

	1921.	1931.
Malays . . . . .	510,821	615,651
Chinese . . . . .	494,548	644,120
Indians . . . . .	305,219	310,752
Europeans . . . . .	5,686	5,988
Eurasians ('Others' in 1931) . . . . .	3,204	21,259

The Indians supply most of the labour for the rubber plantations. The Chinese play a very large part in the life of the community and the country strikes one as being predominantly Chinese. The Chinese form the greater part of the merchant, artisan, and clerical classes as well as supplying most of the skilled and unskilled labour for mining enterprises and much of the general coolie labour. The Malays are content from their indolent nature to occupy a back place. Yet the community is in many respects an ideal one; racial and labour problems are almost absent, for it is found that the Europeans and leading Chinese work well in harmony, while balance is preserved amongst the masses between the Chinese and Malays.

The revenue of the States in 1933 was \$44,000,000, being derived largely from Customs duties, licences (especially in connection with export of rubber) and railways. The riches of this prosperous Federation are derived largely from the two main commercial enterprises—the cultivation of rubber and the mining of tin. The Government has spent the money wisely and there is an excellent series of motor roads throughout the country—over 2,800 miles of metalled roads. The excellen

Government-owned railways, though only metre gauge, are well managed and through communication is available between Singapore and the Siamese capital of Bangkok. There is an efficient police force of Malays and Indians, with European and Malay officers. The Education Department controls between 600 and 700 schools with an attendance of over 50,000. There are numerous Chinese schools not controlled by the Education Department.

Kuala Lumpur (104,000) is the largest town in the Federation and the centre of commercial activity. It is connected by rail and road with Port Swettenham. The staple products are rubber, rice, coconuts, sugar, tapioca and pepper. The exports, however, pass mainly through the Straits Settlements ports of Singapore and Penang. Leading exports are rubber, tin ore and copra; imports, rice, cotton goods, petroleum products, sugar, milk and tobacco.

*The States not included in the Federation.* Of these five States, Johore entered into a treaty with Great Britain in 1885; the remaining four lie along the Siamese border and the rights of suzerainty and protection were handed over by Siam to Britain in accordance with the Anglo-Siamese Treaty of 1909. In all five States the ruling Sultan is assisted by a council and acts under the advice of a British Adviser.

Johore occupies an important position at the southern end of the Peninsula, separating Singapore from Malacca and the Federated States. It has an area of 7,500 square miles and a population of about 490,000. It has shared more or less automatically in the rapid development of the Federated States and has a large export of rubber and copra, areca-nuts, tin and tapioca. The F.M.S. Railways have leased the length of line traversing the State and linking Singapore with the northern States. Johore is joined to Singapore by a causeway across the Johore Strait.

The four northern States are less developed than the Federated States or Johore. They are mainly agricultural, but rubber planting is important, especially in Kedah and Kelantan.

**Communications and Foreign Trade.** Repeated reference has already been made to the excellent system of roads and railways; the position of which is shown in Fig. 214. Great care is necessary in dealing with statistics of Malaya in that some figures refer to the whole area of Malaya, some to the Federated Malay States or Straits Settlements only. Figures are now (since 1922) available for the foreign trade of Malaya as a whole, excluding trade between the Federated Malay States and Straits Settlements. It is found that nearly all the foreign

trade of Malaya passes through the ports of Singapore (three-quarters of the whole), Penang and Malacca. The chief port of the Federated Malay States is Port Swettenham.

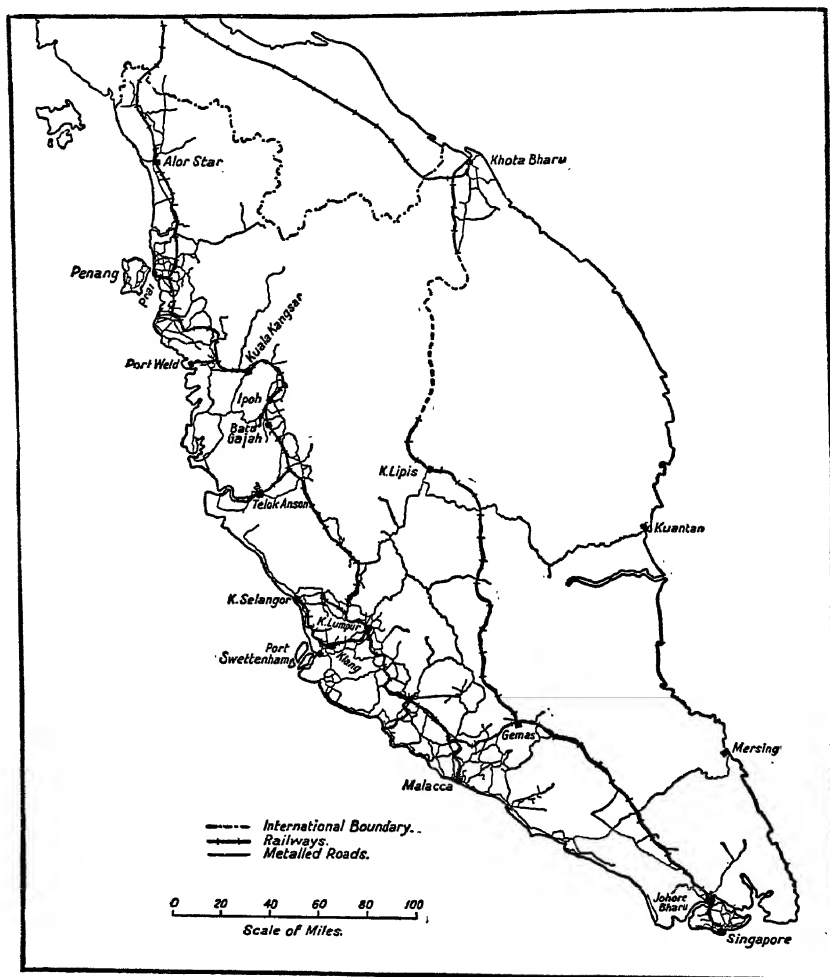


FIG. 214.—The communications of Malaya—railways and metalled roads.

This map emphasizes the remarkable development of the tin and rubber country on the western side of the peninsula—where there is a very fine network of motor roads—when compared with the eastern. The east coast railway is now complete.

If one takes the trade of the Straits Settlements themselves, it is found that the same items figure on both the import and export sides—illustrating the function of Singapore and Penang as collecting and distributing centres.



The town of Singapore itself is somewhat spoilt by the existence in the centre of an evil-smelling creek, crowded with native craft. The business quarter centres round this creek, but the

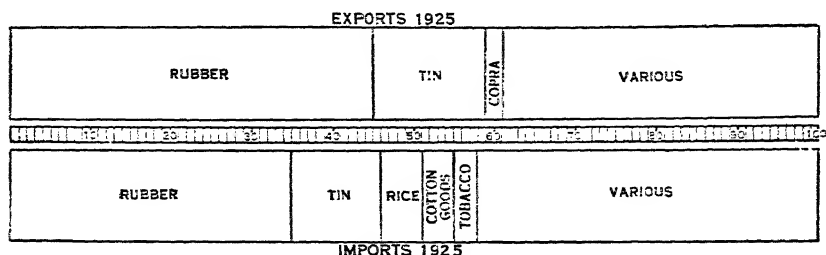


FIG. 215.—The foreign trade of the Straits Settlements, showing the entrepôt character of the trade.

It should be noted that the tin and rubber, imported mainly from the Federated Malay States, represent a greater proportionate value of the exports and actually also a greater intrinsic value because of the treatment they undergo in Singapore. Note.—In recent years no comparable figures have been published.

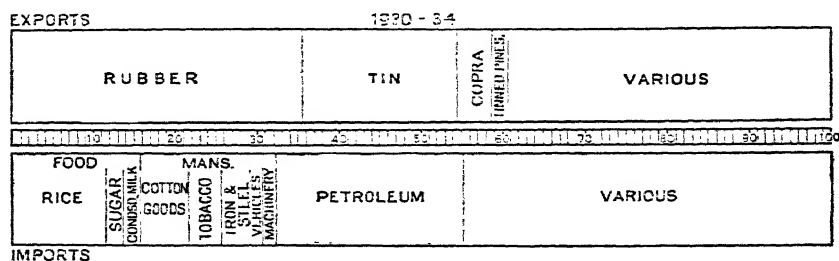


FIG. 216.—The foreign trade of British Malaya (F.M.S., Unf.M.S. and S.S., eliminating internal trade).

Tobacco = tobacco, cigars, and cigarettes. Con. milk = condensed milk.

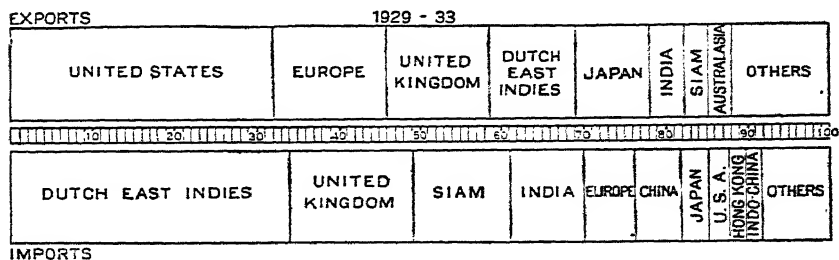


FIG. 217.—The direction of the foreign trade of British Malaya.

Indo-China = French India and Indo-China.

better residential areas are in attractive hilly outskirts. The docks lie to the west of the town, and extensive land reclamation and wharf extension works are in progress.

## REFERENCES ON MALAYA

There are numerous excellent books on Malaya, amongst which high place must be given to those published by the Malay States Information Agency, London. These include the *Handbook to British Malaya*, 1926, by R. L. German, and a number of pamphlets such as *Rubber in Malaya*, *Tin Mining in Malaya*, *Malayan Commerce*, etc. An excellent handbook is *Malaya*, by R. O. Winstedt (London: Constable, 1923). In a lighter vein is R. J. H. Sidney, *In British Malaya To-day* (London: Hutchinson).

From another point of view *The Modern Malay*, by L. R. Wheeler (London: George Allen & Unwin, 1928), is excellent.

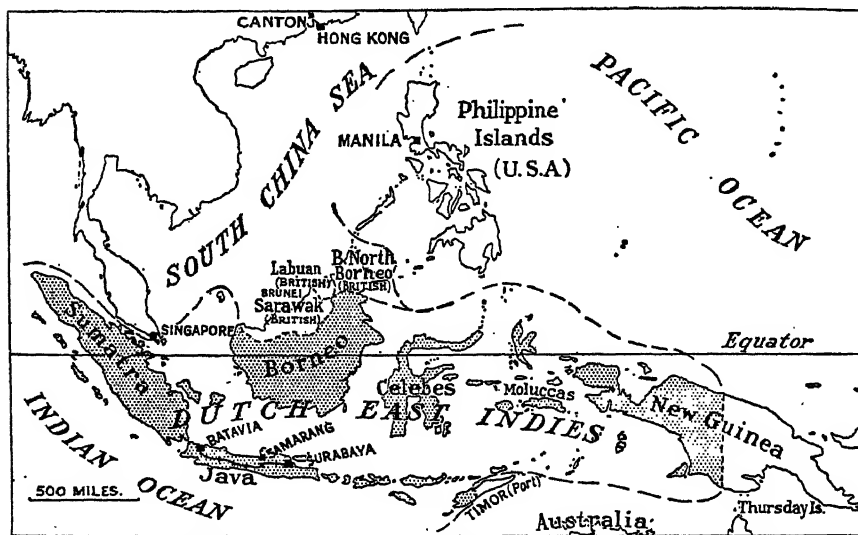


FIG. 218.—Political map of the East Indies, showing the extent of the Dutch possessions.

## THE DUTCH EAST INDIES

The Dutch possessions in Asia include the greater part of the East Indies, excepting only the northern and north-western parts of Borneo, which are British, and the eastern half of the island of Timor, which is Portuguese. The Dutch East Indies are the legacy of the Dutch East India Company, formed in 1602, which conquered successively and ruled the islands until 1798, when the administration was taken over by the Dutch Government. It should be noted that the Dutch East Indies include the western half of the island of New Guinea, which, geographically, is usually linked with Australia. The total area is about 733,296 square miles and the population (1930) about 60,730,000. The Dutch East Indies fall naturally into two parts:

- (a) Java and Madura, with an area of only 51,057 square miles, but a population of 41,718,000—equal to a density of about 817 per square mile—at the end of 1930.
- (b) The Outer Territories, with an area of about 682,000 square miles, but a population of only about 19,000,000—equal to a density of roughly 36 per square mile.

The contrast is obvious.<sup>1</sup> Limitations of space prevent an adequate treatment of the Outer Territories; attention will be devoted mainly to Java and Madura, brief notes being added on the remaining islands.

### JAVA AND MADURA <sup>2</sup>

The curious contrast between Java and Madura on the one hand, and the Outer Territories on the other hand, has already been pointed out, and for that reason alone Java and Madura deserve special consideration.

Java, with its satellite island Madura, is in many ways unique. It is one of the most densely populated agricultural countries in the world, with 817 persons per square mile (Census of 1930), yet a very large proportion of the surface is over 3,000 feet above sea-level and of necessity the density drops to 300 to the square mile in certain of the more mountainous districts. This remarkable density has been attained in the last century: in 1800 the total population was estimated between 3 and 4 millions, in 1850 11 millions, in 1900 28 millions and in 1926 36.9 millions. A study of population changes seems to indicate that saturation-point has been reached in certain areas, but a rapid increase is still marked in the more remote areas, especially in the south-east, where sugar plantations are still replacing evergreen forests. Javanese form the bulk of the population and furnish an almost unique example of an industrious Equatorial race. In contrast to Malaya, Java has only half a million other Orientals (chiefly Chinese, 582,000 in 1930). On December 31st, 1926, there were in Java no less than 192,000 Europeans, the great majority of whom are of Dutch descent. Again Java is unique: the Dutch have settled in and colonized an Equatorial country. It is true that the Dutch population

<sup>1</sup> R. Eichelberger, 'Regenverteilung, Pflanzendecke, und Kulturentwicklung in der ostindischen Inselwelt, *Geog. Zeits.*, 1924.

<sup>2</sup> In this section great use has been made of the paper 'Java: the Economic Geography of a Tropical Island', by S. van Valkenberg, *Geog. Review*, Vol. XV (1925), pp. 563-83. An interesting general work on Java is H. S. Banner's *Romantic Java as it Was and Is* (London: Seeley Service, 1927).

is mainly urban—there are 31,000 in Batavia, 12,500 in Semarang, 19,500 in Bandung, and so on—but it is impossible not to be struck by the contrast between the Dutch in Java and the English, for example, in Malaya. The Dutchman goes to Java to settle, he does not live counting the months to his triennial 'leave', he has evolved a bungalow residence essentially European in type except for the well-furnished 'stoep' or porch which

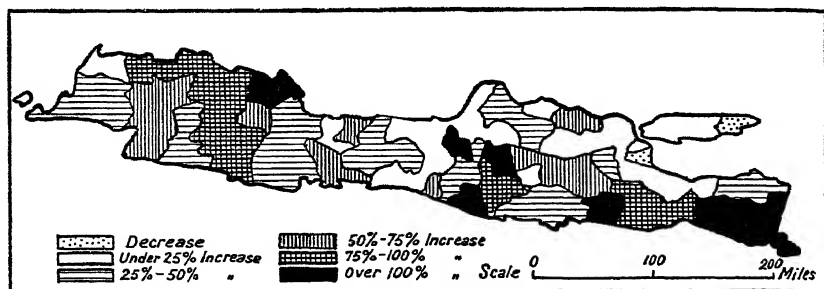


FIG. 219.—Changes in the density of the population of Java and Madura, 1895-1920.

This map shows that the plainlands of Madura and the north, including the sugar country round Surabaya, must be regarded as already fully developed and that progress in opening up new land has been made principally in the mountainous country towards the south coast. (After van Valkenberg.)

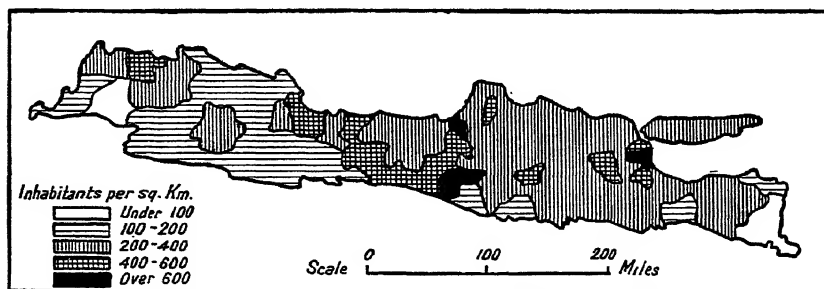


FIG. 220.—The population of Java : density in 1920.

(After van Valkenberg.)

serves as the principal living-room. He rises above the need for the electric fans so inevitable in European dwellings elsewhere in the East; he even rises above the need for the thick sun helmet; his golden-haired children play bareheaded in the streets almost as they would do in Europe. The colour bar is less marked in Java than in most places in the East, and there is, or has been, a considerable amount of intermarriage; the Eurasians do not form a very distinct community, but mix freely

ith the pure Europeans. he death-rate among the omiciled Europeans is ow—between 16 and 19 er 1,000, thus approxi- ating to that in the eat cities of Europe and merica. It is, perhaps, rue that the weaklings— en, women and children —are repatriated if the limate is found not to gree with them, so that hose who remain are of igrorous stock; but the act remains that people f European stock have ome successfully accli- natized in an Equatorial limate. The majority etire to a Javanese hill station such as Garoet or Sukabumi rather than to Europe. Among the natives, with an average death-rate of 18 per 1,000, health conditions com- pare very favourably with those in India or China. The Javanese are sturdy, brown-skinned Mongo- lians; the bulk of them are Mahommedans.

Structurally Java consists of a late Tertiary fold with its main axis parallel to the length of the island. The main ridge resulting from the fold lies nearer the south coast than the north and accounts for the more rugged nature of the south. The exposed rocks are almost entirely Ter-



FIG. 221.—A physical map of Java and Madura.  
Reduced from the official maps.

tiary in age ; it is rarely that the older core is exposed. But the dominant feature in the geology and topography of Java is the numerous volcanoes which burst out along the line of weakness. A score or more reach heights exceeding 8,000 feet, many are over 10,000 feet and rise to those cloud-capped heights in a beautiful symmetrical concave-sided cone. Several of the volcanoes are still in the solfataric stage of activity ; Mount Bromo in the east is still active, whilst lava eruptions from others have occurred within the last century. The loftier volcanoes and the higher ridges are of necessity uncultivated waste land, but elsewhere a climate characterized by heavy rainfall and great heat has resulted as usual in rapid and deep weathering and the formation of a soil lateritic in character but exceptionally fertile, as soils derived from volcanic rocks frequently are. In the north of the island there are broad spreads of alluvials derived from this rich parent rock. Volcanic and soft Tertiary strata, combined with the climate, thus explain the amazing fertility of Java as a whole despite the comparatively small area of flat land—an interesting contrast with Japan.<sup>1</sup>

Broadly Java falls into five parallel strips :

- (a) The entire northern coast, with few exceptions, is an alluvial plain, forming some of the most fertile rice and sugar lands in the island. Here are found the chief towns and ports, though natural harbours do not exist.
- (b) Inland there follows an undulating or hilly tract of Tertiary rocks which furnish a soil much less fertile than that of either the alluvium or the volcanic rocks. Here are found the oilfields of Java—the very important mineral wealth of the island (see Fig. 222) and most of the teak plantations.
- (c) The volcanic belt consists of a complex string of volcanoes separated by high plains filled with volcanic ash of great fertility. Many of the smaller tuff-cones are terraced from base to summit, and it is in this part of Java that one sees the amazing panoramas of curvilinear paddy fields rising one above the other in a seemingly endless succession. The higher slopes of the volcanoes

<sup>1</sup> The contrast may be expressed thus :

	Java.	Jap <sup>n</sup> .
Percentage of surface below 600 feet . . .	36	30
Percentage of surface formed by volcanic rock . . .	36	32
Percentage of surface cultivated . . .	80	20
Population per square mile . . .	717	260

The contrast is, in the main, due to the relative inability of the Japanese climate to form soil rapidly from comparable materials.

are often forested and attract a heavy rainfall, which is stored sufficiently long to assist in the irrigation of paddy fields late in the season.

- (d) The fold-mountain belt of Tertiary limestones and sandstones lies towards the southern coast. Large areas are rugged and wild, still covered with dense ever-green forest and forming a barrier between north and south, which is broken in two main areas only. Rubber plantations are replacing the forests in the Preanger and Bantam regencies in the west, but the east holds out less prospect of development.

- (e) The narrow coastal strip in the south consists largely of raised coral reefs covered with laterite or hill-wash.

Climatically Java is just outside the Equatorial belt, properly

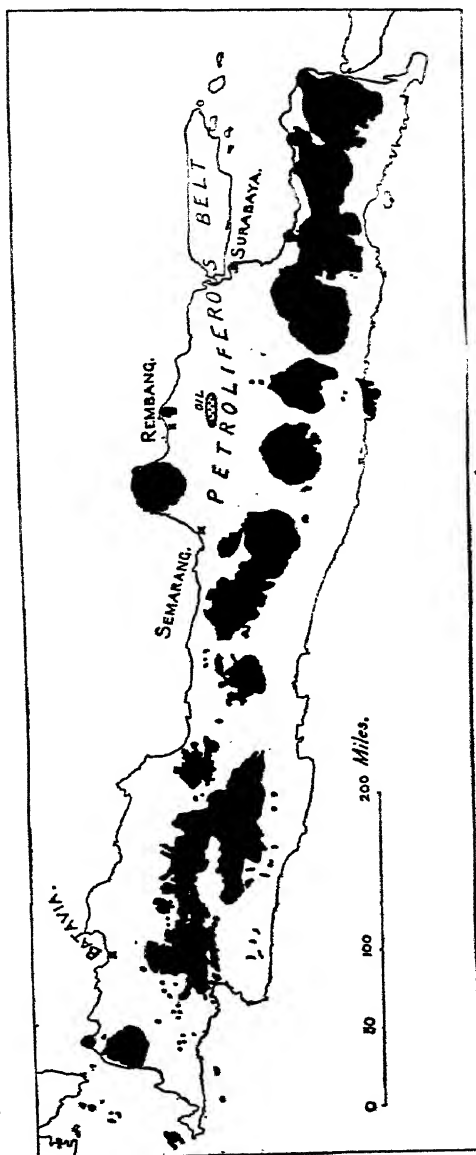


Fig. 222.—Sketch-map showing the large area covered by volcanic rocks (in black) in Java. The coincidence of the volcanic areas with the peaks shown in Fig. 221 should be noted.

speaking, being situated between  $6^{\circ}$  and  $9^{\circ}$  S. Nevertheless, Java is sufficiently near the Equator to have the small annual range of temperature characteristic of truly Equatorial stations. In Batavia, a typical example, the yearly average is  $78.6^{\circ}$  F. ( $25.9^{\circ}$  C.); the annual range between January, which is curiously enough the coldest month, and May, the hottest, is less than two degrees. In Java temperature depends upon altitude, not upon season. The decrease in the average yearly temperature

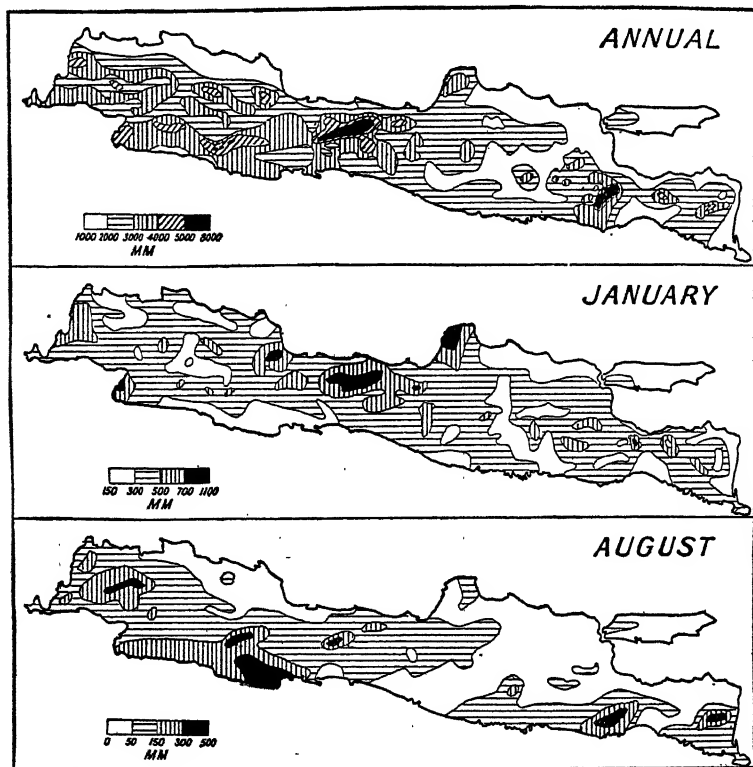


FIG. 223.—The rainfall of Java.

is about  $1^{\circ}$  F. for every 310 feet of ascent. The snow-line would lie far above the tops of the highest mountains, but frosts are common on calm nights in the dry season, especially on high enclosed plateaus, from 4,500 feet upwards. The high humidity throughout the year is another characteristic of the climate; even in the driest month the mean relative humidity at Batavia is 78 per cent. Broadly speaking, there are two seasons in Java, the dry season and the wet season, but the terms are comparative



ther than absolute. In the 'dry season' the island is under the influence of the east or south-east monsoon (especially marked July, August and September), which naturally brings heavy rainfall to most of the southern coastal strip, though it is the dry season for most of the island. In the wet season the west or north-west monsoon blows, especially in December, January and February, and is the main rain-bearing wind except along the southern coast. But at all seasons local winds are important and overshadow the monsoon currents; the mountainous nature of the country is reflected in the irregularity of the rainfall, for there is a marked coincidence between the mountains and areas of high precipitation. Much of the rain actually falls during thunderstorms.

Over the fertile lowlands of Northern Java the annual rainfall is, in general, between 40 and 80 inches, and it is very desirable to protect cultivation, especially rice cultivation, by irrigation works which shall insure a regular and constant supply of water and by protection works against flooding. The strong surf along the southern coast has prevented the formation of deltas, but all the little streams flowing northwards carry large quantities of silt and have built up considerable deltas, still rapidly increasing in size. The streams tend to raise their beds by silt deposition above the level of the surrounding plains and hence the danger of disastrous floods. Thus permanent works for irrigation and flood control now protect about 2,000,000 acres of cultivated land, and works planned or in progress affect another 2,000,000 acres. Nearly £1,000,000 annually have recently been spent on these works.

Agriculture in Java is divided naturally into native agriculture and plantation agriculture. The greater part of the soil of Java is claimed as Government property, being let out on hereditary long lease to native cultivators. The principal privately-owned estates, held by Europeans or Chinese, are in Western Java.

The main product of native agriculture in Java<sup>1</sup> and the staple food of the people is rice. Nearly a quarter (25 per cent.) of the surface of the island is under wet paddy (8,070,000 acres), a further 3½ per cent.—amongst the mountains—under dry or hill paddy (1,100,000 acres). In the plains the young rice plants are planted out in the early part of the rains and harvested in the early part of the dry season, the land being used for secondary crops or left fallow for the remainder of the year, but in the little irrigated terraces which cling to the slopes of the mountains there is no set seed-time or harvest. Despite

<sup>1</sup> Figures are for areas harvested in 1932.

the huge production Java is not self-supporting and imports rice. It has been pointed out that rice culture alone cannot support a higher density of population than 200 to 250 per square kilometre (510 to 640 per square mile); Java, with 817 to the square mile, is thus dependent partly upon import. Native diet in Java is more varied than in most rice-eating countries: maize covers 4,950,000 acres; cassava, 1,680,000 acres; sweet potatoes, 420,000 acres; ground-nuts, 485,000 acres; soya beans, 421,000 acres; other pulses, 523,000 acres; native-grown tobacco, 347,000 acres; potatoes, 45,000 acres; native-grown sugar-cane, 38,000 acres; indigo, 11,650 acres; capsicum (chillies), 140,000 acres; native-grown tea, 69,500 acres. Other crops make the total under native cultivation to over 19,500,000 acres. Amongst the native crops grown partly for export the chief are cassava (from which tapioca is made) and coconuts. On account of its high quality there is a considerable export of Java rice.

Quite distinct are the plantation crops, grown mainly on European owned or managed estates for export. Sugar-cane easily occupies first place, covering an area of between 400,000 and 450,000 acres, yielding 2,500,000 to 2,900,000 tons of sugar, prepared by about 180 factories (1930-35). The sugar plantations are found almost exclusively on the plains of Central and Eastern Java. Government policy aims at securing an adequate food supply for the huge native population, and hence forbids an increase of sugar acreage at the expense of rice; expansion of area under sugar is practically impossible. Current practice is for the sugar companies to sub-rent the necessary ground from the natives once every three years. The constant aim has been increase of yield, hence the output of over 40 tons of cane per acre, and the co-operative working of the mills have done much to make Java, after Cuba, the largest exporter of sugar in the world, with a production about 10 per cent. of the world's total.

Tea takes second place amongst the plantation products, and is grown on hill-slopes, terraced to encourage adequate drainage and to prevent soil erosion by rain, especially between 1,000 and 4,500 feet above sea-level. The upper limit is set by night frosts. The output is showing a marked tendency to increase and the total from Java and Sumatra reached 52.7 million kilos (115,000,000 lb.), but in the last few years has averaged about 100,000,000 kilos (220,000,000 lb. or 100,000 tons). Ninety per cent. of the production is from European or Chinese managed estates, mainly in Western Java (Preanger Regency), but about 15 per cent. of the production is from Sumatra.

Coffee is one of the old-established plantation industries.

as in Ceylon and South India, the trees suffered from the coffee-bean blight and the original *Coffea arabica* gave place to *Coffea iberica*, but it was not until the introduction of *Coffea robusta* from Africa in 1901 that the disease was successfully combated. The present trouble is another pest, the coffee beetle. The coffee plantations are mainly among the hills of Eastern Java,

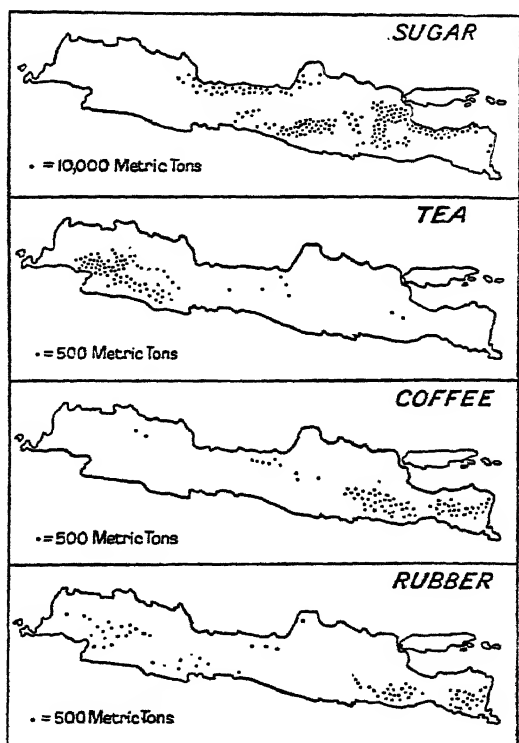


FIG. 224.

FIG. 225.

FIG. 226.

FIG. 227.

FIGS. 224-227.—The chief plantation crops of Java, based on the average of the years 1922-27.

Total productions :—Sugar, 1,977,625 metric tons ; tea, 45,051 metric tons ; coffee, 38,966 metric tons ; rubber, 39,391 metric tons.

where there is a more pronounced dry season of special value to coffee. The yield varies considerably from year to year.

The area under rubber in Java has increased enormously in recent years, though the acreage is less than in Sumatra. Java tobacco has a good reputation ; the land is sub-rented from the natives, as is the case with sugar. The cultivation is especially important in Central Java around Jokyakarta and Surakarta. Another plantation crop is cacao, with an annual yield of from

713 tons (1927) to 1,450 tons (1932). Of special interest is the cultivation of cinchona, for long practically a Government monopoly. Java now supplies nearly the entire world production of quinine and has rendered the old name 'Peruvian bark' quite a misnomer. The yield of quinine from Javanese bark is now double that of the original Peruvian bark. The estates are nearly all in Preanger, especially south of Bandung at elevations of 4,500 to 6,000 feet. Java also provides a major share of the world's cocaine, obtained from the leaves of the coca tree.

Live-stock is relatively unimportant in Java. The 3 million buffaloes are needed in the rice-fields; so also are some of the 5 million cattle, though these include Australian and Friesian cows imported as dairy cattle and kept on the mountain pastures to maintain a milk supply for Europeans. There are 1.4 million goats and 0.8 million sheep, as well as 100,000 pigs kept mainly by the Chinese. Horses number 680,000.

The forests, which cover large areas of the southern mountains, are economically less important than the teak plantations, which cover 1,800,000 acres of the lowlands of Central and Eastern Java, where there is a pronounced dry season and the rainfall is less than 80 inches.

Amongst native industries that of bamboo-hat plaiting and the famous batik work (for which Jokyakarta is one of the chief centres) may be noted. Although imported cottons printed with the old batik patterns have largely killed the real batik industry, there is still a touch of racial pride in the desire of many Javanese to possess at least one sarong or some garment of genuine batik. It may be explained that batik working is a process of dyeing cotton cloths. Elaborate patterns are traced on the fabric, all parts *not* to be dyed are covered with wax on both sides (applied warm and allowed to cool). The cloth is then dipped a dozen or more times in the dyeing solution—blue or brown as the case may be. The wax is then cleaned off; the parts already dyed covered with wax and other patterns traced on the undyed portions before the whole is dipped in the second dye. Elaborate patterns in dark blue, brown and white are thus produced in great variety and striking individuality. Native copper working is another industry of interest.

Java has an excellent road system with two main roads running east and west connected by a number of cross-roads. The railways (3,000 miles) centre on the three main ports of Batavia, Semarang and Surabaya. The old harbour of Batavia is now used as a fishing port and the fine new, well-equipped harbour of Tanjung Priok lies 5 or 6 miles to the east. Semarang has only an open roadstead, but Surabaya is well sheltered by

the island of Madura and a harbour basin has recently been constructed. These three ports are respectively the main outlets of Western, Central and Eastern Java. There are several other small ports, Tjilatjap on the south coast; Cheribon, Pekalongan and Pasuruan on the north coast. Amongst important inland centres, there is the fine city of Buitenzorg with its famous botanical gardens; Bandung, in the heart of the fertile high plains of West Java; Garut, a delightful hill station; and Jokyakarta and Surakarta, two native towns with over 100,000 inhabitants in Central Java. Java is fortunate, from the Europeans' standpoint, in having a number of excellent hill stations.

The nature of the foreign trade of Java is seen from the diagrams. Batavia, it should be noted, has a considerable entrepôt trade, but in this respect is overshadowed by Singapore, only 36 hours' steaming away.

#### SUMATRA <sup>1</sup>

The large island of Sumatra consists of a mountainous volcanic

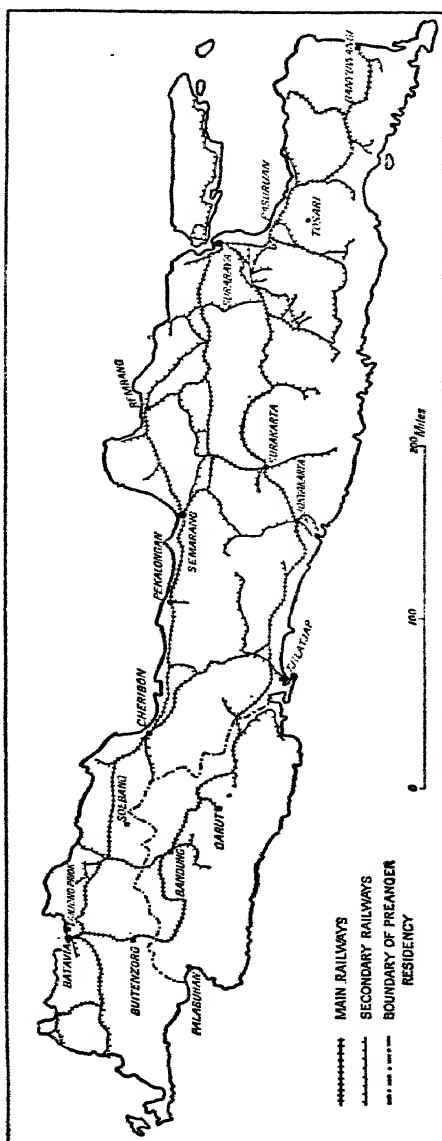


FIG. 228.—The railways of Java.

<sup>1</sup> A magnificent great volume of 560 pages, sumptuously illustrated, is O. J. A. Collet's *Terres et Peuples de Sumatra* (Amsterdam, 1925).

backbone lying near the west coast, and a broad stretch of undulating or low land forming the east of the island. Economically interest centres on the remarkably rapid development which is taking place. Details are mentioned in connection with the rubber, palm-oil, tea, tobacco and other crops. Javanese

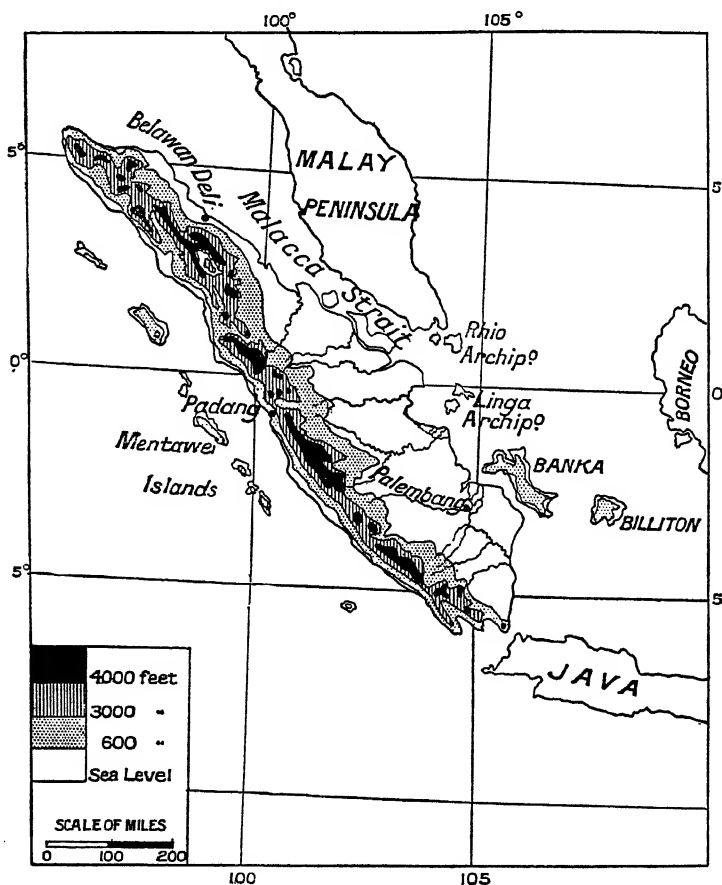


FIG. 229.—Sumatra.

Note.—Billiton is an older alternative spelling of Belitong.

are emigrating from Java to Sumatra and there are also numerous Chinese immigrants and a few Tamils. Railway construction is in active progress. The chief ports are Belawan Deli and Padang. With a total area of 163,138 square miles, the population in 1930 (Census) was over  $7\frac{1}{2}$  million and is rapidly increasing.

SINGKEP, BANKA AND BELITONG <sup>1</sup>

These little islands form a continuation of the Indo-Malayan mountains of Malaya, and, like the latter, are rich in tin. Singkep forms one of the islands of the Rhio-Linga Archipelago. It is from these islands that the tin ore of the Dutch East Indies is obtained.

## BALI AND LOMBOK

Bali, 'the jewel of the East', adjoins the eastern end of Java and shares the physical and some of the economic characters of the larger island, and is even known as 'Little Java'. With an area of rather over 4,000 square miles and a population of over 1,800,000, the population density in Bali and Lombok reaches nearly 443 (1930). Between Bali and Lombok is a deep channel, famous as the position of 'Wallace's Line', which the great naturalist held to separate the Asiatic and Australian fauna and flora.

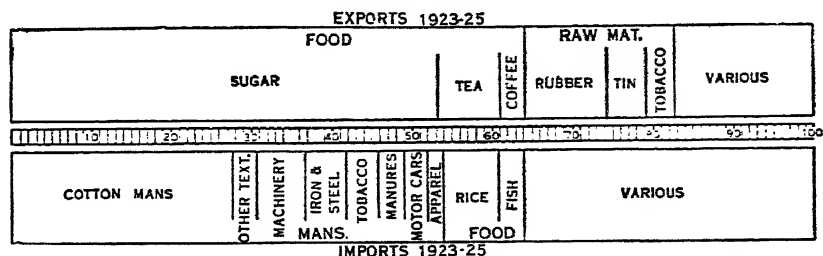


FIG. 230.—The foreign trade of Java and Madura (data from the *Stat. Abst. for Neth. East Indies*, 1926).

Notes.—Tobacco = cigars, cigarettes and tobacco; apparel = clothes and fancy articles.

## TIMOR AND ITS DEPENDENCIES

The island of Timor has long been a bone of contention between Portugal and Holland, the disputes being finally ended by treaty in 1899 whereby Holland obtained rather less than half the island. As a result of the constant wrangling between two masters, European influence and prestige in Timor have been relatively small. Climatically and in flora and fauna Timor resembles the neighbouring coasts of Australia rather than the more Equatorial islands. The Dutch dependencies of Timor are the Flores, Solor and Alor groups of volcanic islands.

## CELEBES AND ITS DEPENDENCIES

Celebes, separated from Borneo on the west by the Strait of Macassar, ranks third in point of size amongst the islands of

<sup>1</sup> For general description of the Outer Territories, see A. Cabaton's *Java and the Dutch East Indies*, translated by B. Miall (London: Fisher Unwin, 1911).

the archipelago. Its area is roughly 72,680 square miles, its population (1930) about 4,200,000, giving a density of 81 for the one residency (Celebes) into which the island is divided and 32 for the other (Menado). Celebes has been likened in shape to the hand of a gouty patient or to a scorpion, but perhaps the description of Tomlinson is better—'a handful of peninsulas tied in the middle and flung into the ocean'. Celebes has all the things needful to make it one of the most fortunate countries in the Indies; an exceptionally fertile soil, largely volcanic, an excellent climate, though one rather less equable than Java

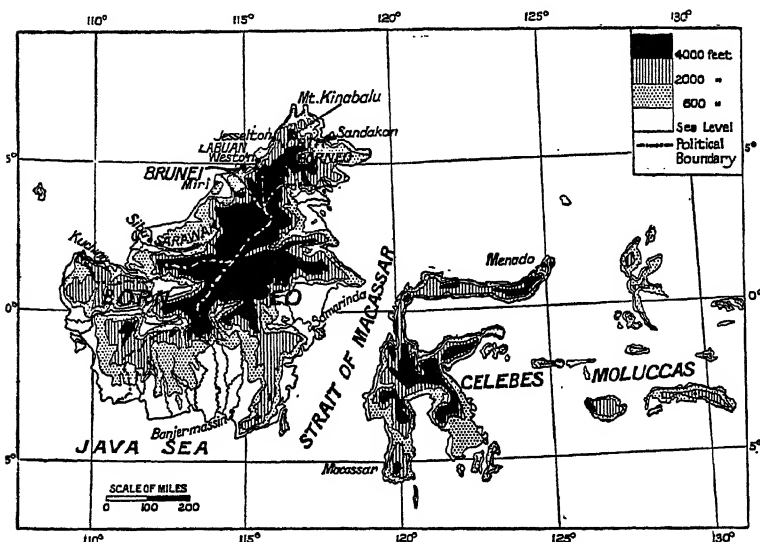


FIG. 231.—Borneo and Celebes.

or Sumatra; numerous secure natural harbours, vigorous and intelligent inhabitants. The Portuguese settled in Macassar in 1625; in 1660 they were driven out by the Dutch. The people of Celebes have been in contact with Europeans thus for three centuries, but much of the island is still virtually under the control of native sultans.<sup>1</sup> Macassar, the chief port, has a considerable export of copra, rattan and macassar oil (derived from the seeds of *Schleichera trijuga* and used as a basis for cosmetics). Menado, in the north, is a clean, prosperous district, exporting copra, coffee and spices (nutmegs and mace).

<sup>1</sup> L. van Vuuren, *Het Gouvernement Celebes* (Batavia: *Encyclopaedisch Bureau*), Vol. I, 1920.



## THE MOLUCCA ISLANDS AND NEW GUINEA

On the west the Moluccas are divided from Celebes by the Sea of Celebes, eastwards they are linked with New Guinea by a mass of islands, some inhabited, many uninhabited. The Northern Moluccas form the Residency of Ternate (area 12,796 square miles, population [1930] *c.* 290,000); the Southern Moluccas the Residency of Amboina (area 17,372 square miles, population 400,000), while Dutch New Guinea is included under Ternate (area 160,692 square miles, approximate population 200,000). The Southern Moluccas were the Spice Islands *par excellence* and in the early days of Dutch occupation were cruelly and unscrupulously exploited.

## DUTCH BORNEO

With a total area of 206,810 square miles, the population of Dutch Borneo is only 2,194,533 (1930), giving a density of under 11. Descriptions are given elsewhere in this chapter of the British Zones in Borneo and notes on the principal industries; space does not admit of further details.

## THE TRADE AND ECONOMIC DEVELOPMENT OF THE DUTCH EAST INDIES

In the preceding pages the contrast between Java and Madura on the one hand and the Outer Territories on the other has been emphasized. Another point of view enforces itself from a study of recent trade and production statistics. Whereas conditions in Java are relatively static and there is little possibility of wide expansion in production of the staples, the Outer Territories are developing with amazing rapidity—especially Sumatra. In 1922 exports from the Outer Territories for the first time exceeded those from Java; this occurred again in 1925 and is likely to remain a permanent feature. Some notes on the principal exports will illustrate the change which is taking place.

*Rubber.* It will be seen at once that the increased share of the Dutch East Indies in the world's rubber supplies is almost entirely due to the flourishing native industry. Though containing a large percentage of water and full of impurities, native-grown rubber can be treated in special factories and becomes a very useful product. Up to the present much of this rubber has been treated in Singapore, but factories have now been erected in Sumatra and elsewhere for this purpose. It has been stated by various writers that the huge increase in the output of rubber from the Dutch East Indies is due to the application of the Stevenson Restriction Scheme. Actually, however, all the

increased production has been from plantations made before the scheme; the enormous numbers of trees planted since have yet to come into bearing. There is no doubt that native rubber from the Dutch East Indies is destined to play an increasing part in the world's markets, especially from 1929 onwards, when the 1923 trees become tapable. At the end of 1925 over 1,000,000 acres were under rubber in European plantations in the Dutch East Indies; no estimate is available of the enormous area under rubber in native holdings. In 1930-32 rather over 40 per cent. of the rubber was from Java, rather under 60 per cent. from the Outer Territories. It is to be noted that foreign capital has been welcomed by the Dutch, and much American capital is invested, especially in Sumatra. The sudden access of wealth enjoyed by the natives from the sale of rubber has resulted in amazing developments in all those parts of the Outer Territories where rubber is grown, and has placed those territories on the high road of economic development already followed by Java. There has been a sudden demand for foreign goods in such districts as Djambi and Palembang in South-east Sumatra and Bandjermasin and Pontianak in Dutch Borneo, and although at first the natives quickly spent their gains, a general development in foreign trade is inevitable.

The following figures, in thousands of metric tons, show the export of rubber in recent years<sup>1</sup>:

	1919.	1920.	1921.	1922.	1923.	1924.	1925.	1927.	1928 -32.
Estate rubber . . . .	66	69	62	72	82	90	106	132	153
Native rubber (dry) . .	13	10	6	17	36	56	88	93	88
Total . . . .	79	79	68	89	118	146	194	225	241
World Production . . . .	331	342	295	380	413	443	525	626	771
Percentage of D.E.I. estate rubber in world produc- tion . . . . .	20	20	21	19	20	20½	20	21	20
Percentage of D.E.I. native rubber in world production	4	3	2	4½	9	13	17	15	11

*Sugar.* Practically all the export of sugar is from Java.

*Coffee.* In 1932 there were 429 coffee estates with 317,875 acres under coffee, of which 82 per cent. were in Java. But

<sup>1</sup> *Report on the Economic Situation of the Netherlands East Indies*, 1927. Department of Overseas Trade, 1928, and later issues.

this does not convey a true picture of conditions, since native holdings are excluded. In the same year the export was 113,785 tons, of which 40,471 were from Java (estate produce solely) and 73,314 were from the Outer Islands. This includes much native-grown coffee, and nine-tenths of the total is *robusta*. In the year 1926 the output of coffee from the Outer Territories exceeded that from Java and afforded another example of the rapid development still going on.

*Tea.* In recent years the output of tea has shown a marked increase in quantity and quality—the latter largely due to the activities of the experimental station at Buitenzorg. Out of 339,260 acres planted with tea 75 per cent. are in Java—mainly in West Java—and 14 per cent. in Sumatra—especially in the East Coast Province. The total production increased from 32,000 tons in 1921 to nearly 60,000 in 1926 and over 77,000 in 1932.

*Palm Oil.* The intensive and scientific cultivation of the African oil palm on the east coast of Sumatra and the results achieved in the past seven or eight years foster the belief that the production of palm oil in Sumatra will soon rank as a principal industry. The cheapest method of shipment has been found to be by tank-ships and the first oil-storage tank was completed at Belawan in 1926. The following record for 1921–27 tells its own remarkable story:

	Area in Production. Acres.	Area Planted. Acres.	Production in Metric Tons.	
			Oil.	Kernels.
1921 . . . .	8,275	31,910	2,149	153
1922 . . . .	9,398	41,175	3,821	512
1923 . . . .	10,280	46,940	3,874	727
1924 . . . .	12,270	59,640	4,924	1,131
1925 . . . .	23,960	78,000	8,734	1,745
1927 . . . .	39,555	106,869	19,493	3,947
1932 . . . .	109,582	175,188	90,072	18,413

The export is almost entirely from the port of Belawan.

*Pepper.* Pepper is grown on a few estates and very largely by the natives both in Java and the Outer Islands. The production varies widely from year to year, being dependent partly on climatic conditions and disease, and especially on cash advances which the growers seek to obtain from local dealers and which are not forthcoming when there is a prospect of low prices. Pepper dealing is, indeed, very speculative. Out of an average production of roughly 35,000 metric tons only about 100 tons

are produced on estates, the remainder being native production. Two-fifths (1929-32) of the total is white pepper, the remainder black pepper. The difference between the two is only one of preparation. The pepper berries grow in bunches and ripen irregularly. The bunches are picked, piled in heaps to induce fermentation before being dried in the sun. The berries are separated from the stems by simply trampling on them. When dry they are sorted and sifted and constitute black pepper ready for the market. For the preparation of white pepper the biggest and ripest berries are selected, put into bags or baskets and immersed in slowly running water. After about eight days the softened flesh can be removed by trampling, and the hard core washed in clean water, and dried in the sun. The principal source of black pepper in the Outer Islands is the Lampong District of South Sumatra, of white pepper the Island of Banka. Considerable quantities of both black and white pepper are exported from Atjeh in Northern Sumatra and the west and south-east divisions of Borneo.

*Petroleum.* The output of crude petroleum from the Netherlands East Indies is more than 5,000,000 metric tons (1930-34). The old fields in Java and Madura yield but a small proportion of the total. In Sumatra are the Palembang and the new Djambi field. In Borneo, now the largest producer, the principal field is the Sanga-Sanga field in Eastern Borneo. A little oil is obtained from the island of Ceram.

*Tin.* Tin occurs in the islands of Banka and Belitong and in the islands of the Rhio-Linga archipelago—especially in Singkep. In 1932, out of a total of 16,540 metre tons, the Banka mines produced 11,450, the Belitong mines 4,250 and the Singkep mines 840 piculs. According to the International Agreement of 1931 the Dutch East Indies were allotted 23,400 tons or 20.63 per cent. of world production.

*Coal.* Out of a total output of 1,050,000 tons in 1932, 615,560 tons were produced by the three State-owned collieries at Ombilin (West Sumatra, Eocene), Poelolaoet (or Palu Laut, island off S.E. Borneo) and Boekitasem (or Bukit Arsam Palembang, Sumatra). The coal is used especially on the railways. There are other mines, chiefly in East Borneo.

*Gold and Silver.* Gold and silver to the value of nearly a million sterling are produced annually in Sumatra and Menado.

*Iodine.* Iodine is recovered from iodine springs in the neighbourhood of Surabaya.

There is a small output of diamonds from Borneo.<sup>1</sup>

<sup>1</sup> For details of other minerals, see H. A. Brouwer, *The Geology of the Netherlands East Indies* (New York: Macmillan, 1925).

*Imports.* The imports of the Dutch East Indies call for no special description and are shown in Fig. 232.

## BRITISH BORNEO

The northern and north-western parts of Borneo, roughly a quarter of the whole island, form part of the British Empire.

EXPORTS (1928-32)

SUGAR	RUBBER	PETROLEUM	COPRA	TEA	TOBACCO	TIN	COFFEE	VARIOUS
10	20	35	45	55	65	75	85	95
MANUFACTURES				FOOD				
COTTON GOODS	MACHINERY	IRON & STEEL	OTHER TEXTILES	TOBACCO	FERTILISER	APPAREL	YARNS	RICE
								FISH
								WINE
								OTHER FOODS
								VARIOUS

IMPORTS (1928-31)

FIG. 232.—The trade of the Dutch East Indies.

Note.—Imports: tobacco = tobacco, cigars and cigarettes; wine = beer, wines and spirits.

EXPORTS

1929-32

EXPORTS											1929-32	
SINGAPORE	NETHERLANDS	U. S. A	INDIA	JAPAN	HONG KONG	FRANCE	OCEANIA	CHINA	GERMANY	EGYPT	OTHERS	
10	20	35	45	55	65	75	85	95	105	115	125	
NETHERLANDS	JAPAN & FORMOSA	SINGAPORE	UNITED KINGDOM	GERMANY	U.S.A.	INDIA	OCEANIA	INDO-CHINA	OTHERS			

IMPORTS

FIG. 233.—The direction of the trade of the Dutch East Indies.

The territory under British influence is organized in three political units:

- (1) British North Borneo.
- (2) Brunei.
- (3) Sarawak.

The island of Labuan, lying off the coast of Brunei, forms part of the Straits Settlements.

*British North Borneo* occupies the northern part of the island and has an area of about 31,106 square miles. The territory is under the jurisdiction of the British North Borneo Chartered Company and is administered by a Governor resident in the country and by a Court of Directors in London.

Physically the country can be divided into three fairly distinct zones called by Rutter the plains, the downs and the

hills. The plains extend behind a coastal fringe of mangrove swamps from two to six miles inland and consist of alluvial flats naturally covered with grass. This tract is well suited to cultivation, on the west coast much of it is occupied by native cultivators of rice, on the north and east coasts it forms valuable land for the growth of tobacco. The downs consist of low hills rising like little islands from the plains. Fruit orchards cover the more fertile of them, but in others the heavy rains have swept away the fertile soil and they are bare but for coarse grass. The hill zone usually commences with great abruptness, range after range rising steeper and higher until they reach 6,000 feet. Most of the ranges run north and south. The whole system culminates in the great granite mass of Mount Kinabalu (13,455 feet), 25 miles from the coast, forming a striking landmark from far and near. Geologically the downs and the lower hill ranges consist mainly of Tertiary sediments, important because of their content of mineral oil and coal.

Most of the rivers of North Borneo have a sandy bar at their mouths, but many, especially those draining towards the east, are navigable by launches, and from time immemorial have formed the chief highways of the country. The Kina-batangan is 350 miles long and navigable for over 200.

The climate of the coastal belts is typically Equatorial. The temperature of the coastal belts averages rather over 80°; the thermometer rarely rises above 95° or drops below 65°. The year falls roughly into two seasons, the season of the north-east monsoon and the season of the south-west monsoon. The north-east monsoon blows from the middle of October to the middle of April and is the principal rain-bearing wind. The south-west monsoon, blowing from April to October, is not so strong, but sudden squalls are frequent, the wind is drier than the north-east monsoon and the months when it is blowing tend therefore to be hotter. The rainfall is generally less in the interior (Tenom, 62 inches) than on the coasts, where it ranges up to 200 inches (Sandakan, 127 inches).

The natural vegetation of the greater part of North Borneo is luxuriant evergreen forest. It would seem that Borneo was cut off from the Asiatic mainland only at a comparatively late period geologically and a large number of the Asiatic mammals occur in Borneo. Of particular interest amongst the animals are the anthropoid apes, including the well-known *orang-utan*.

The population of British North Borneo at the Census of 1931 was 270,223, consisting mainly of Chinese and Mahomedan settlers on the coast and aboriginal tribes inland. The Europeans numbered 340; Eurasians, 236; Chinese, 47,799;

lalays, 11,494. The number of natives was 205,218, the most numerous being the Dusuns, Muruts and Bajaus. The chief towns are Sandakan (13,826) on the east coast and Jesselton on the west coast.

The British North Borneo Company holds the land under grants from the Sultans of Brunei and Sulu. North Borneo was declared a British Protectorate in 1888, and in 1898 certain order lands were acquired from the Sultan of Brunei. For purposes of administration the country is divided into five residencies, which are subdivided into districts.

The chief products are timber, sago, rice, coconuts, gums, coffee, fruits, spices, rubber, tobacco, tapioca and canes. In recent years there has been a rapid rise in the production and export of plantation rubber and tobacco. Timber is also a staple export. Mineral oil, coal, iron and gold are obtained.

In 1913 the imports were valued at £634,500; the average for 1928-32 was £822,000. The principal imports are rice, piece goods and machinery. In 1913 the exports were valued at 863,100; the average for 1928-32 was £1,044,000. The increase in exports is largely due to rubber (67 per cent. of the total in 1925, but only 8 per cent. in 1932), tobacco and timber. The foreign trade is carried on mainly through Singapore and Hong Kong with Great Britain and the Colonies.

There is a railway (127 miles) from Jesselton to Melalap, with a branch to Weston on Brunei Bay.

The unit of currency is the dollar (2s. 4d.), but the State issues its own coins and notes.

*Brunei* lies in the centre of the north-west coast, between the State of North Borneo and Sarawak. This little State of 1,000 square miles is a British Protectorate under the rule of a native Sultan with a British Resident as adviser.

Structurally the same three zones may be distinguished as in British North Borneo, and the geology is a continuation of that of the neighbouring States. The average rainfall is over 100 inches.

The population, according to the 1931 Census, numbers 10,135, including 2,683 Chinese, 377 Indians and 60 Europeans. The remainder are Malays and native races. The chief town is Brunei, on the river of the same name. The old town was actually built over the water of the river, but the main new town is now on the mainland.

Most of the interior is heavily forested and there are numerous kinds of valuable timber. Agricultural products include sago; plantation rubber is increasing in importance. 'Cutch' is the

name given to an extract of mangrove bark. Mineral oil is now being worked.

The imports are mainly rice, piece goods, machinery and tobacco; the exports, rubber, jelutong and cutch. The trade is chiefly via Singapore and there is a regular steam-launch service between Brunei and Labuan, whence Singapore is reached in four days. The native industries include boat-building, cloth-weaving, silver-working and brass-working, especially at Brunei town.

*Sarawak* has an area of 42,000 square miles and lies south of Brunei along the north-west coast. It is a State ruled with pure autocracy by an English Rajah. In 1842 the Sultan of Brunei granted control of part of the present area of Sarawak to the Englishman, Sir James Brooke, who thus became the first Rajah. The young State was nearly overthrown by a Chinese mutiny in 1857. Additions of territory were made in 1861 and 1905, and in 1888 Sarawak was occupied as an independent State under the protection of Great Britain. The present Rajah, His Highness Charles Vyner Brooke, is the third, and succeeded in 1917.

As in North Borneo there is usually a flat coastal strip separated from the mountainous interior by a belt of downs or hills. Geologically the mountain ranges of Borneo, including Sarawak, belong to the great Tertiary or Alpine system of folds. The oilfields are situated on anticlines on the flanks of the main ranges.

Several of the larger rivers are navigable by large steamers for some distance into the interior and the rivers still form the principal highways of the country.

The climate on the whole resembles that of North Borneo, but the rainfall régime varies and in some areas the wettest months are between April and October, as they are in India.

The population is estimated at about 475,000, mainly Malays and such native peoples as Dyaks, Kenyahs and Muruts, but there are large numbers of Chinese settlers. As in other parts of the East, there is a marked division of trades and professions amongst different nationalities. The Chinese supply the merchant and artisan (especially carpentry) classes as well as the best agriculturists, cooks and water-carriers; the Malays are fishermen and woodsmen and personal servants; the Indian 'dhobi' or washerman and the small Indian shopkeeper are also present. The Chinese, Malays and Indians preserve, in the main, their national costumes.

The chief towns of Sarawak are the capital, Kuching, about 23 miles from the mouth of the Sarawak River; Sibü, about



0 miles from the mouth of the Rejang River, and Miri, the headquarters of the Sarawak Oilfields, Limited.

The agricultural products include sago and pepper; plantation rubber is increasing in importance. Fishing is an important industry. In recent years very important oilfields have been developed at Miri and Bakong in the Baram district and production of oil in 1925 amounted to 613,000 metric tons and in 1926 to 633,000 metric tons, followed by a steady increase.

The foreign trade has shown a marked increase in recent years, since rubber and mineral oil products represent three-quarters of the total value of the exports. In 1927 imports were valued at £2,160,000 and exports at £3,490,000. The leading exports were plantation rubber (50 per cent. of the whole value of exports), benzene, kerosene, oil fuel and crude oil, sago flour, pepper and fish. In 1932 values of foreign trade had fallen to half; rubber representing only 7 per cent. of the exports, oil 44 per cent. The trade is carried on mainly through Singapore. The currency is that of the Straits Settlements.

#### REFERENCES

There are numerous books dealing with ethnography and with exploration and adventure in the interior of the great island of Borneo, but there are few works from the geographical standpoint. The following are the more important general works:—

- C. Bruce: *Twenty Years in Borneo* (London, 1924).
- O. Rutter: *British North Borneo* (London, 1922).
- S. Baring-Gould and C. A. Bampfylde: *History of Sarawak* (London, 1909).
- A. Ireland: *The Far Eastern Tropics* (London, 1905).
- I. H. N. Evans: *Among Primitive Peoples in Borneo* (London, 1922).

#### THE PHILIPPINE ISLANDS

The Philippine Islands have an area of 114,400 square miles, distributed among no less than 7,083 islands and islets, but only 466 have areas of one square mile or over. By far the largest islands are Luzon, 40,814 square miles, and Mindanao, 16,906 square miles. Nine others, Samar (5,124 square miles), Negros, Palawan, Panay, Mindoro, Leyte, Cebu, Bohol and Masbate, have areas of over a thousand square miles. The Philippine Islands were ceded by Spain to the United States after the Spanish-American War in 1899. Under the United States the islands have developed greatly and have received a gradually increasing measure of self-government.<sup>1</sup> The Governor-General is appointed by the President of the United States; under him are the secretaries of six executive departments, who must all be Filipinos. The legislative body is made up of two houses, the Senate and the House of Representatives. The Senators number twenty-four, of whom twenty-two are elected

<sup>1</sup> The self-government offered in 1933 was rejected.

by popular vote; the Representatives number ninety-three, of whom eighty-four are elected by popular vote. The Council of State forms the connecting-link between the Legislative and the Governor-General and is composed of the latter as President, the six secretaries and the presidents of both houses.

The Philippine Islands stretch from south of Formosa in latitude  $20^{\circ}$  N. southwards to the Sulu Islands in about latitude  $5^{\circ}$  N. They thus lie almost entirely outside the Equatorial

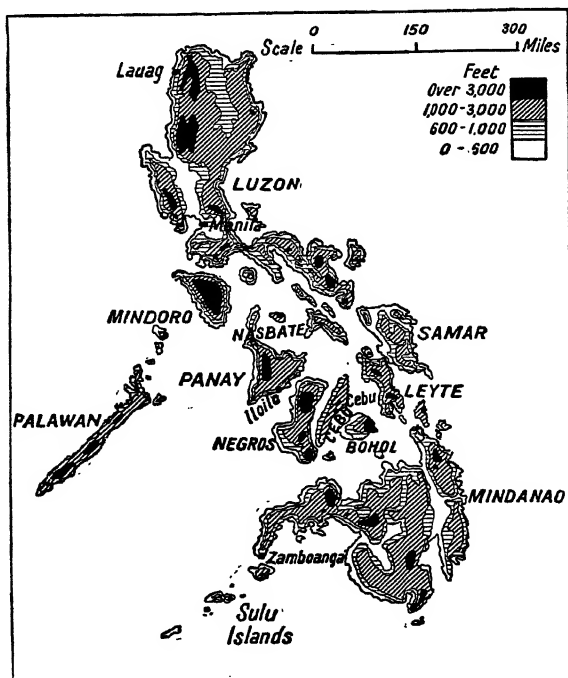


FIG. 234.—The Philippine Islands—physical map.

Belt and their climate is determined in the main by the Asiatic monsoons. According to the rainfall régimes three or four climatic regions are distinguished <sup>1</sup>:

- (a) All the western parts, in which the wet and dry seasons are sharply differentiated, the wet lasting from June 15th to December 1st, i.e. during the period of the Indian monsoon.

<sup>1</sup> José Coronas, 'The Climate and Weather of the Philippines, 1903-1918,' *Govt. Phil. Isl. Census of 1918* (Manila, 1920).

- (b) The eastern parts have a humid, cloudy climate with heavy rain throughout the year but with a marked maximum in winter when the rain is derived from the normal North-East Trade Winds (December to May). In the months from June to December, the rain is derived from the monsoon winds of which the direction, on the average, is roughly southerly and hence which bring rain to the east as well as to the west coast.

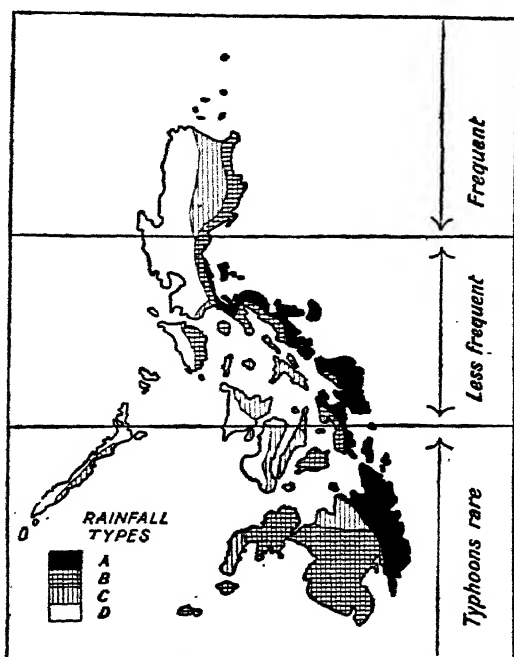


FIG. 235.—The climate of the Philippine Islands—rainfall types after José Coronas.

1. East Coast climate, with rain throughout the year but with a winter maximum from the North-East Trades.
2. Transitional type with short dry season (March and April).
3. Transitional type with no marked dry season.
4. West Coast climate, with sharply differentiated wet and dry seasons.

[Note.—A corresponds to (b) described in the text; D to (a) and B C to (c-d).]

- (c-d) The central belt of the islands has a climate which is transitional in character, either having a dry season restricted to March and April (especially in the north) or having no marked dry season but no marked period of maximum rainfall.

The majority of the typhoons for which the South China Sea and the East China Sea are notorious originate between latitudes  $8^{\circ}$  and  $15^{\circ}$  N. to the east of the Philippines. They are most

frequent from July to November, less frequent in May, June and December and rare in other months, being almost entirely absent in February. The Philippine Islands may be divided into three belts, the southern, central and northern. Typhoons are very rare in the southern belt and not very common in the central, but the northern part of the islands lies right in the track of the majority of the disturbances at their most violent stage. The frequency of typhoons is an important factor in the economic development of the islands.

Structurally<sup>1</sup> the islands consist of Tertiary fold ranges and may be considered as the crumpled edge of the Asiatic continental platform. Close to the eastern margin of the group is a great foredeep in which the deepest known part of the Pacific is located—only 50 miles from Mindanao. The China Sea to the west of the archipelago is probably a sunken block or *graben*. The land areas of the Philippines are merely the higher portions of the partly submerged mountain chains—in part folds involving Tertiary sediments, in part the summits of volcanoes. The fold ranges may have been formed in part in pre-Tertiary times, but were uplifted in the main towards the end of the Miocene and again at the end of the Pliocene. Finally, there has been considerable recent uplift. The general trend of the arcs or fold lines has been shown in Fig. 207. It is noteworthy that pre-Tertiary sedimentary rocks cover but an insignificant area; Tertiary sediments and igneous rocks are the dominant rock types. Nearly all the higher mountain ranges are built up of plutonic or extrusive rocks. Active volcanoes are numerous and both active and extinct volcanoes form a striking feature of the Philippine landscapes.

The leading mineral product is gold, together with a little silver and platinum recovered during the refining operations. Other minerals include coal, iron, gypsum, limestone and guano. The total value has steadily increased since 1922 and reached \$18,500,000 in 1932. Except for gold panning, mining enterprises in the Philippines involve heavy capital expenditure, and it is this factor in the main which is responsible for tardy development.

**Production.** Out of a total area of 29,629,600 hectares, or nearly 75,000,000 acres, forests cover 64 per cent.; grass or bare lands, 19 per cent.; mangrove swamps, 1 per cent.; 'unexplored' lands, 4 per cent.; while 12 per cent. (3,608,980 hectares) are classed as cultivated.

<sup>1</sup> A full account of the geology and mineral resources is now available in Warren D. Smith's *Geology and Mineral Resources of the Philippine Islands*. Manila: Government Printing Bureau, 1925 (dated 1924).

The commercially exploitable forest lands cover 72,660 square miles. In the south the forests are of the Equatorial type<sup>1</sup> and furnish hardwoods for constructional and cabinet uses, as well as rattans, bamboos, tan and dye barks and dye woods. Other trees yield gums and resins and vegetable oils as well as gutta-percha. Large areas are covered with bamboo. Somewhere in this book there has been occasion to lament the appalling destruction of fine forest by shifting aboriginal cultivation. The same is true of the Philippines. Sixty per cent. of the deforested area—40 per cent. of the area of the archipelago—is to-day covered with commercially worthless second-growth forest or giant grasses.

The principal crops may be judged from the acreage planted the year ending June, 1926 :

	Hectares.		Hectares.
Coffee . . . . .	1,755,920	Sugar-cane . . . . .	231,840
Maize . . . . .	533,570	Tobacco . . . . .	74,790
Root potatoes . . . . .	76,480	Rubber . . . . .	2,410
Cacao . . . . .	492,050	Bananas . . . . .	94,820
Cocnut . . . . .	485,030	Mangoes . . . . .	12,310

The principal food crops are rice and maize and no comment is necessary except to point out that production is insufficient and that there is a large import of rice as well as of wheat and wheat flour. This has been the subject of comment and adverse criticism directed against the administration on more than one occasion. H. J. Waters<sup>2</sup> in 1918 stated that 'less than one-half of the agricultural lands of the islands are in cultivation. The Philippine Islands have a population of only 8,750,000 and do not import more foodstuffs per capita than does Japan with a population of more than 50,000,000. If the Filipino sugar planters harvested as much sugar to the acre as do the planters

Java, the Philippines, without increasing the area in cane, would be the leading cane-sugar producing country of the world, Cuba alone excepted. If the rice growers of the Philippines obtained as high acre yields as do the growers of Japan or the United States, instead of buying from India and Japan one-fourth the rice consumed in the islands, the Philippines would be the third largest rice-exporting country in the world.' That

<sup>1</sup> Valuable detailed studies of variation according to elevation have been made by W. H. Brown, 'Vegetation of Philippine Mountains,' *Manila Bur. of Sci. Publ.*, No. 13 (1919). Another important paper, in connection with a study of Asiatic vegetation, is E. D. Merrill, 'Distribution of the Dipterocarpaceæ,' *Philippine Jour. of Sci.*, Vol. XXIII, 1923, p. 1-33.

<sup>2</sup> 'The Development of the Philippine Islands,' *Geog. Review*, Vol. V, 1918, pp. 282-292.

conditions have, in some directions, improved markedly is evident from the description which follows.

The great 'cash' crops are abaca or Manila Hemp, coconuts and sugar-cane, with rubber of increasing importance in the south.

The hemps are the great rope-making fibres and may be separated into the true or soft hemps and the hard hemps. The principal hard-fibred hemp is abaca or Manila hemp, in the production of which the Philippine Islands have practically a monopoly. It is obtained from the stems and huge leaves of *Musa textilis*, a plant of the banana family—indeed the plants so closely resemble bananas that the uninitiated cannot distinguish them. The plants require well-drained soil, hence are frequently grown on steep hill-sides, an evenly distributed rainfall and constant high humidity. For long the industry was in native hands; nearly all stripping was done by hand and the quality of the fibre was largely a matter of good or bad stripping. In 1913 Manila hemp formed 45 per cent. by value of the exports of the islands; in 1921-31 the quantity was greater but the percentage only half the pre-war figure.

Coconut products<sup>1</sup> form the leading exports of the Islands, and in the production of copra and coconut oil, the islands may be classed as the leading country in the world. There is a very large demand for coconut oil in the United States—averaging 327,000,000 lb. in 1919-23, of which 64 per cent. was for soap, 30 per cent. for oleo-margarine and 6 per cent. for lard compounds—and the bulk of the requirements is obtained from the Philippines. Of all vegetable oils coconut is most highly esteemed in the States because of its readily saponifiable properties which render it suitable for cold process soaps, as well as because it is the only oil for the manufacture of soaps which will lather in salt water (marine soaps) and one of the few which forms soft soap with caustic soda. The high percentage of glycerine also renders the oil of special value. Consequently coconut planting has been developed as a plantation industry in the island to a degree which is not found in Ceylon or Malaya, where the coconut groves are mainly in native hands. The distribution of the plantations is limited primarily by climatic factors—to the central and eastern regions because of the well-distributed rainfall, to the centre and south because of the typhoons of the north. In the south the coconuts come into competition with abaca. The plantations do best on plains sloping downwards to the sea, where the drainage is good but

<sup>1</sup> L. J. Borja, 'The Philippine Coconut Industry,' *Econ. Geog.*, Vol. III, 1927, pp. 382-390.

culating waters renew the supplies of plant food; this is well seen on the slopes of Mount Banahao. When establishing a plantation the nuts are first germinated and then transplanted when the seedling is about a foot high. Experiments have shown that light and air in plenty are essential for a good yield, hence the trees are spaced 10 metres—33 feet—apart. They come to bearing at the age of six years and continue for thirty or forty years. Some idea of the spread of the industry may be judged from the rise in production from roughly 125,000 metric

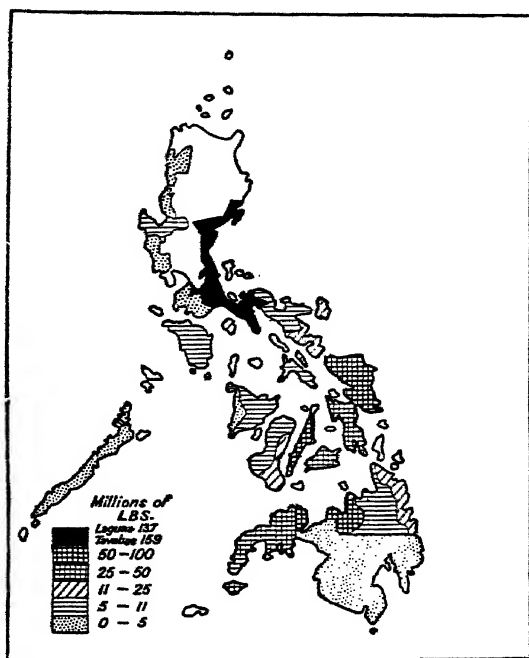


FIG. 236.—The production of copra in the Philippine Islands in 1920-4.

(After L. J. Borga.) This map should be compared carefully with that showing climatic regions.

tons of copra (oil converted to copra at 0.6 lb. oil = 1 lb. copra) in 1910-13 to 367,000 tons in 1921-24, and from 22 per cent. of the world's total in 1913 to 30 per cent. in 1922. In 1932, the export alone was equivalent to 404,000 tons of copra (213,000 tons copra and 114,700 tons oil). The best copra is obtained from very ripe nuts, just about to fall, and the elimination of unripe nuts is one of the several ways in which large, carefully controlled plantations can maintain the quality of the copra. The cloudy skies of the islands prevent sun-drying in many

areas and have thus proved a blessing in disguise in that the installation of modern hot-air drying apparatus is general and is gradually eliminating the old smoke-drying. Although there has been, since 1910-14, a 75 per cent. increase in exports of copra, the main increase in the export trade has been in the form of oil—from 7,500,000 lb. in 1910-14 to 230,000,000 in 1925 and 255,000,000 in 1932.

The sugar-cane cultivation has also entered recently upon a new phase. In 1913 Dean Worcester was able to record the fact that one modern central mill had been established, otherwise 'the machinery and methods employed might almost be called antediluvian, and it is a wonder that sugar could ever have been produced at a profit under such conditions . . . deep ploughing was unknown . . . there was not an irrigated field of cane in the islands'. The recent progress is indicated by export figures. In 1913, 157,300 metric tons of sugar (mainly raw) were exported; in 1925 the total reached 546,800 tons. Since 1932-33 production has been restricted—to 1,250,000 tons of raw sugar and 70,000 tons refined.

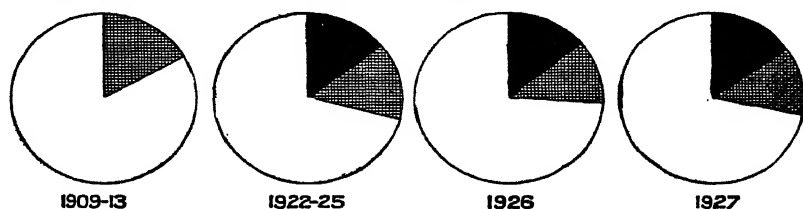


FIG. 237.—The position occupied by the Philippine Islands in the world's production of copra and coconut oil.

The complete circle represents the world's production (coconut oil converted to copra); in black, the coconut oil production of the Philippines; lined, the copra production.

Another leading crop is tobacco, of which the domestic consumption is very large and the export considerable. Bananas form an important part of the food of the people but do not figure as an export. Rightly or wrongly it has been held that most of the tropical products imported by the United States might be produced in the Philippines, including rubber, coffee, cocoa and tea.

The leading animals in the Philippine Islands are the heavy water-buffalo (carabao), especially important in the rice-fields. There were 2,076,000 on December 31st, 1931, together with 1,260,000 cattle, 344,000 horses and mules, 3,000,000 pigs, 1,500,000 goats and 350,000 sheep.

Manufacturing industries are in their infancy and the making of hats is one of the most interesting of the old native industries.

**Communications and Trade.** There are railways in Luzon (705 miles), Panay and Cebu (132 miles), as well as 9,000



es of roads. Apart from inter-island trade, most of the  
merce centres on Manila. Out of the vessels entered in  
2, 235 of 1,300,000 tons were American, 383 of 1,550,000  
s British, 236 of 870,000 tons Japanese.

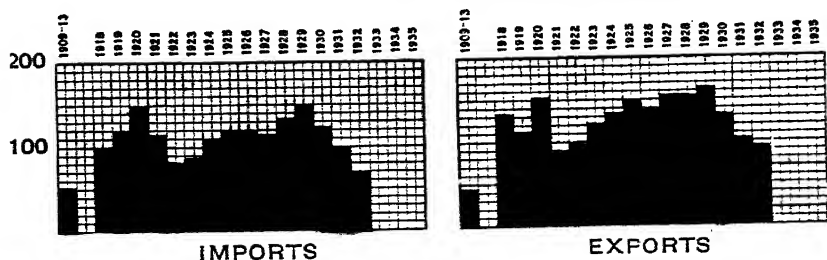


Fig. 238.—Graphs showing fluctuations in the value of the trade of the Philippine Islands.

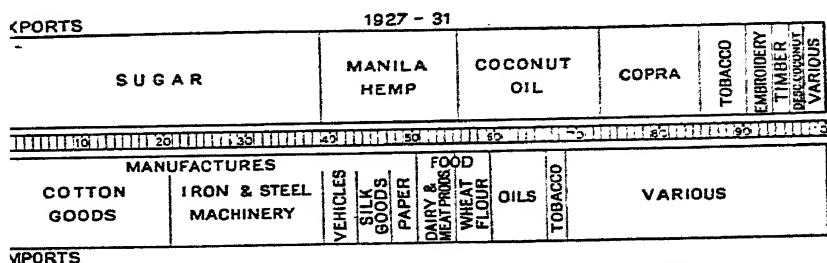


FIG. 239.—The foreign trade of the Philippine Islands.

Note.—Tobacco includes manufactured and unmanufactured.

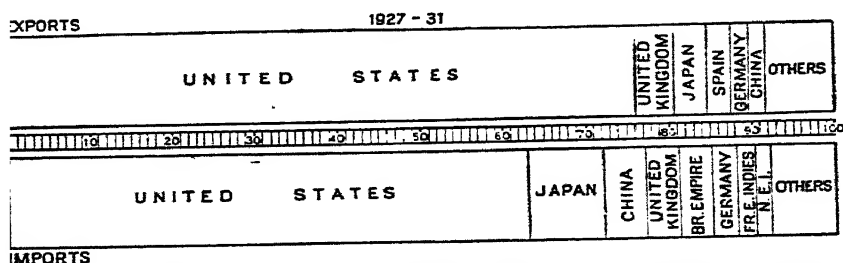


FIG. 240.—The direction of the foreign trade of the Philippine Islands.

Roughly 75 per cent. of the foreign trade is with the United  
states. The chief articles imported and exported are shown in  
Fig. 239.

**Population.** The total population, according to estimate of 1932, was 12,590,000, the bulk of whom are 'Filipinos', allied racially to the Malays and converted to Roman Catholicism by the Spaniards. The Independent Filipino Church, with rituals resembling those of the Catholic Church but proclaiming that modern science is superior to Biblical tradition, denying the possibility of miracles and conceiving God as a single invisible Father, is said to embrace nearly half of the 11,000,000 Christians. Mahommedans number 440,000 in Mindanao and Sulu, and there are numbers of pagans still in outlying tracts. The Filipino-Spanish half-castes form an interesting and distinctive group of some importance.

Manila is the capital and chief industrial and commercial centre, with a population in 1932 of 341,000. The Chinese community (20,000) is important in Manila. Other towns are Iloilo on Panay (44,000); Cebu on Cebu (79,000); Legaspi (Albay) (35,000) and Laoag (42,000) on Luzon; and Zamboanga on Mindanao (24,500). The Philippines have a hot-weather capital in Baguio.

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An interesting general work on the islands is Dean C. Worcester's *The Philippines, Past and Present* (London: Mills & Boon; New York: Macmillan), 2 vols., 1914. There is an extensive general literature, but of greater interest to geographers are the scientific investigations published notably in the *Philippine Journal of Science*.

#### SIAM

The independent Kingdom of Siam has an area of slightly over 200,000 square miles, but a population in 1929 of rather over 11,506,000. The great majority of the inhabitants (nearly 10,500,000) are Siamese, or Thai, and are closely akin to the Shans of Burma. Siam is indeed probably identical with the word Shan. The country is called by its inhabitants Thai or Muang-Thai—'the kingdom of the free'. The limits of the kingdom have varied considerably even within comparatively recent years, consequent especially upon the definition of the French sphere of influence to the east. A new phase in the history of Siam was inaugurated by the Treaty between Siam and Great Britain, ratified in 1926, which recognizes the full jurisdictional and fiscal autonomy of Siam and the relinquishing of extra-territorial rights by Great Britain. Siam was, till 1932, one of the few surviving absolute monarchies. The King is now advised by a Council of State, consisting of 14 to 24 members. There is also a Legislative Assembly half of whose members are nominated by the King, half elected by popular vote, all appointed

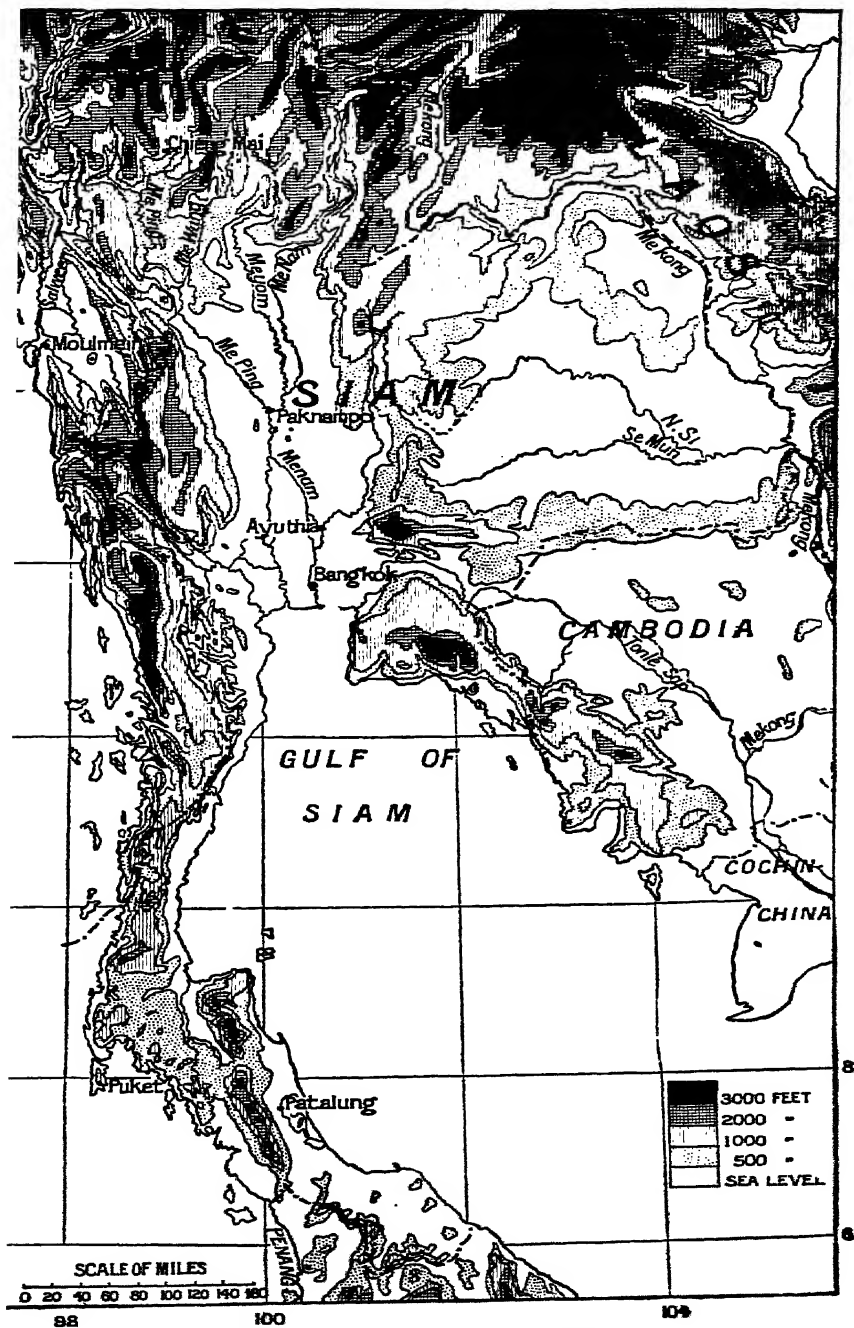


FIG. 241.—General map of Siam.

by the Crown. The country has been divided since 1934 into ten circles, all of which, except that of Bangkok, are under Lord-Lieutenants. They are further divided into provinces, districts and communes.

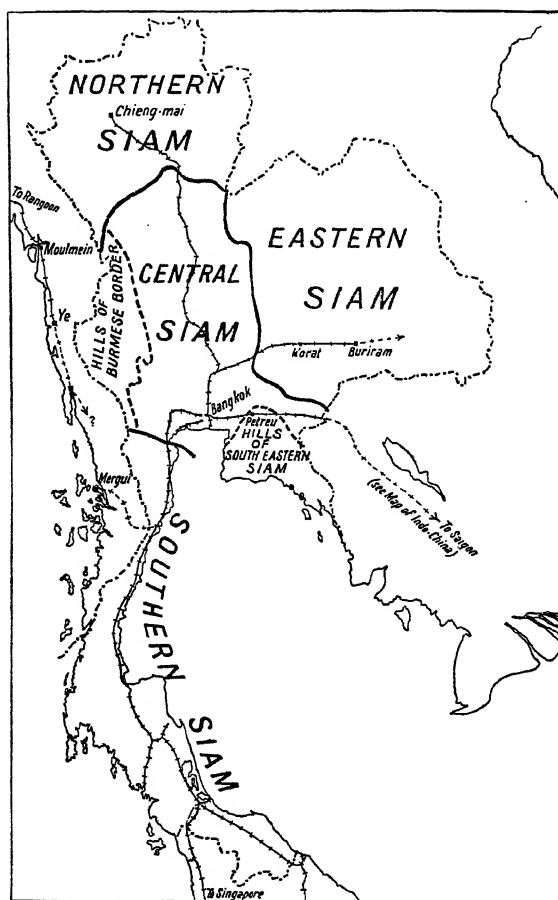


FIG. 242.—The natural regions of Siam, showing also existing railways and railways under construction.

Geographically Siam falls naturally into four main divisions—Northern, Central, Eastern and Southern Siam.

*Northern Siam* embraces an area of some 60,000 square miles, and consists of a series of roughly parallel hill ranges and valleys

tending north and south. The hills gradually increase in elevation towards the west and north, reaching heights of over 5,000 feet. They are all thickly forested, except where scarred by the clearings of hill tribes or interrupted by masses of bare rock. The hills are drained by numerous streams, of which those on the extreme west join the Salween; those on the extreme north the Mekong; but the remainder flow southwards into four streams which eventually join about latitude 6° N. to form the Menam.<sup>1</sup> The valleys range from broad, open cultivated tracts to narrow forested gorges. Naturally the valleys are broader towards the south, wide banks of rich alluvium fringe the streams and form some of the most valuable agricultural land in the kingdom. The town of Chiang-mai lies in the heart of this region and is connected with Bangkok by rail.

*Central Siam* has an area estimated at 55,000 square miles and consists virtually of one vast plain stretching from the mountains on the borders of Burma on the west to the ridge which bounds Eastern Siam on the east, and for 300 miles from the north to the head of the Gulf of Siam in the south. Only here and there do small hills rise abruptly to interrupt the general dead level. The plain lies at a very slight elevation above sea-level, and is subject to regular annual floods. It is drained by sluggish streams—of which the Menam is the chief—whose beds have been raised slightly above the level of the plain by their own alluvial accumulations. 'Belts and patches of jungle occur to the northwards as well as in the east and west border districts, but the greater part of the plain consists of wide expanses, thinly clothed with tall Palmyra palms, dotted with the clumps of bamboo which mark the presence of villages, or absolutely treeless. The surface soil is heavy, clayey and entirely of alluvial formation, and about a quarter of the area is under cultivation, while the rest, covered in the main with grass and reeds, awaits a practicable scheme of irrigation and the coming of a population, which two factors alone are wanting to make Central Siam one of the greatest rice-producing districts of the world' (Graham, 1912). Since these words were written the Royal Irrigation Department has opened up considerable tracts north of Bangkok, connecting by a canal the Menam and the Chao Phraya Rivers and constructing numbers of smaller canals. In 1916 the Prasak South Canal Project, by which 250,000 acres will be irrigated, was started upon. The great plain of Central Siam lies in the immediate hinterland of Bangkok.

*Eastern Siam* has an area of about 65,000 square miles and

<sup>1</sup> Menam = THE river; properly the Menam Chao Phaya.

consists of a huge shallow basin, encircled by hills. The basin is drained eastwards by the Se Mun and N. Si, which unite before joining the Mekong. Included in Eastern Siam is also a strip of country between the Mekong and the girdle of hills just mentioned, and the whole region is bounded on the north east and east by the Mekong itself, forming also the boundary of the kingdom. Most of Eastern Siam has an indifferent soil and an adverse climate. Thin scrub jungle covers the slopes of the hills, huge swamps much of the low ground, at least during the rains—or dried-up wastes of grass and reeds in the hot season. 'A population of some million and a quarter, Laos, Siamese and Kambodians, that is, about 20 people to the square mile inhabits this inhospitable land, wresting from the reluctant soil crops barely sufficient to maintain an existence which passed amidst damp and mud for one half of the year and in a dry, hot and dust-laden atmosphere for the other, is one of the most miserable imaginable, more especially since this whole neighbourhood is peculiarly liable to the visitations of epidemic diseases affecting both men and cattle' (Graham).

*Southern Siam* has an area of about 25,000 square miles and comprises all the narrower part of the Malay Peninsula, and further north a strip between Lower Burma and the Gulf of Siam. In some places this strip is scarcely a dozen miles wide and slopes steeply from the coast to the mountain divide or the Burma frontier. Further south the region is sharply divided by the central range into an east coast and west coast tract. 'The natural scenery of this district is very beautiful, making a picture, constantly repeated with minor variations, of cerulean blue water, golden beaches, villages nestling among tall palm-trees, miles of rolling evergreen jungle behind these, and at the back of all the magnificent purple mountains towering into the sky. Though generally of a hilly character, the east coast district comprises several broad open plains of varying extent where, on a light but rich soil of clay and sand alluvium, crops of rice are annually grown and large herds of cattle are raised. Round about the towns of Lakon and Patalung the largest and most fertile plains are situated. In these open lands a considerable population lives and prospers exceedingly by agriculture and by fishing in the seas which are here alive with fish of many kinds. Far different from that of the people of Eastern Siam, their lot is of the happiest, for with plenty to eat, and equal climate and little or no disease, they scarce know the meaning of trouble' (Graham). The western coast of the peninsula is more indented than the eastern and resembles that of Tenasserim (Burma) to the north. On one of the islands lies

the town of Puket, long famous for its tin mines, and with a large Chinese population. It is through the delightful east coast region of Southern Siam that the railway between Malaya and Bangkok runs.

Siam may be said to have one great river of its own—the Menam. Both the Salween and Mekong for considerable distances form the boundaries of Siam, but the Menam and its tributaries lie completely within Siamese territory. The Menam (or Menam Chao Phaya, to use the full name) is to Siam what the Irrawaddy is to Burma. Of the four head streams the Meping and Mewang are rapid shallow streams liable to sudden floods; the Meyom and Menam to the east rise at lower elevations and flow quietly to the confluence at Paknam Po, being navigable for about 140 miles above that point. From there to the sea the waters of the Menam follow a number of tortuous courses. On one of the channels lies the old capital of Ayutia. The low banks are thickly fringed with bamboos and tall palms 'shading and half concealing an almost continuous succession of longstraggling villages, interspersed with innumerable monasteries, temples and pagodas.' The river is thronged with craft of all kinds, a highway, a sewer, and the sole water supply for a large proportion of the people of Siam. Bangkok bestrides the Menam about 20 miles from its mouth and is remarkable for its size relative to the total population of the country. Its population is over 600,000 and it handles 85 per cent. of the foreign trade of Siam. The position of Bangkok on the Menam with its innumerable side-creeks has made the city a Venice of the East.

Geologically the hills of Northern, Western and Southern Siam form part of the great Indo-Malayan mountain system. The higher ridges are usually of granite; the other rocks are gneisses, schists, slates, sandstones and limestones varying in age from pre-Cambrian to early Mesozoic and including occasionally lake-basins of younger rocks, exactly as in Malaya and Eastern Burma. The shallow basin of Eastern Siam has a rim composed on the north and west mainly of limestone. The interior of the basin is covered with alluvium, in which lateritic soils prevail. Central Siam is nearly all alluvium, the occasional hills being of limestone. Siam naturally shares in the mineral riches of the surrounding countries; the minerals are numerous and varied. Tin is especially important in the island of Puket; tin and wolfram are also found in other parts of the Siamese portion of the Malay Peninsula. Alluvial gold is widely distributed and has been spasmodically panned by natives and Chinese—especially in the slack seasons for agri-

culture. Coal and iron, zinc, manganese, antimony and other minerals also occur.

The climate and seasons in Siam closely resemble those of India—the so-called cold season from the end of October to February, the hot season from March to May and the rains from June to October. Central Siam benefits from the cooling winds from the Gulf of Siam from March to October; the basin of Eastern Siam is cut off from these and suffers greater extremes as well as a lower rainfall. The south of Siam, in the peninsula, has a short dry season and a small annual range.

The classification of vegetation drawn up for Burma applies equally well to Siam. The teak forests of the north-west are commercially important; the cutting of the timber is an important industry and is mainly in British hands. The logs are either floated down the Menam to Bangkok or, to a less extent, down the Salween to Moulmein in Burma. Exports of teak between 1921-22 and 1926-27 were between 50,000 and 60,000 tons, worth between £600,000 and £800,000.<sup>1</sup>

The chief product of Siam is rice. It forms the national food and the staple article of export. It normally covers an area of over 7,000,000 acres and the yield in recent years has varied between 2.2 million tons (1925-26) and 5.3 million tons (1932-33). Other crops of note are pepper, tobacco and betelnuts; rubber in the extreme south. Cotton could be grown in considerable quantities. Siam has over 4 million bullocks, over 4 million buffaloes, a quarter of a million horses and over 8,000 elephants. Fishing is important in Siam, for just as every meal consists of rice, so every meal is flavoured with fish—roasted, fried, boiled or raw; fresh or 'preserved'. The Buddhist religion of the vast majority of the Siamese deprecates the taking of life and animal life; that a fish, removed from the water, is foolish enough to die is a dispensation of Providence.<sup>2</sup>

The railway communications of Siam are shown in Fig. 242, which also indicates the extensive building programme now in hand. Nearly all the railways are State owned. Since January, 1922, through expresses have run between Bangkok and Penang (27 hours) and Singapore, as well as between Bangkok and Chiang-mai (26 hours).

The great port of Siam is Bangkok, and it is visited annually by about 1,000 vessels with an aggregate tonnage of over

<sup>1</sup> Falling during the depression to 38,000 tons in 1932-33, worth £300,000.

<sup>2</sup> Kapi (the ngapi of the Burmese) is a fish paste made of scraps, oddments, small fish, rare fish and doubtful fish, sand and salt, pounded and kneaded, often by bare feet, in a kapi trough and allowed to ferment before being dried into little cakes or stored in jars. Its use, and likewise its ineradicable odour, permeate the furthest corners of the country.



1,000,000 tons (1922-23 to 1932-33). Roughly a third of the tonnage is British. As a port Bangkok suffers from a bar at the mouth of the Menam which permits the passage of vessels of under 13 feet draught only.

The main features of Siam's foreign trade are shown in Figs. 243-4. Amongst the exports the overwhelming importance of rice is noteworthy; the prosperity of the foreign trade and the existence of a favourable trade balance depend largely

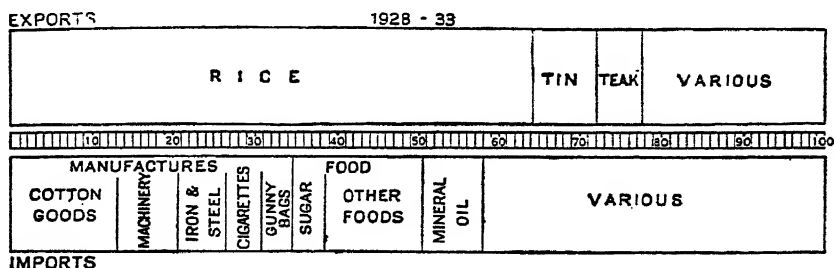


FIG. 243.—The foreign trade of Siam.

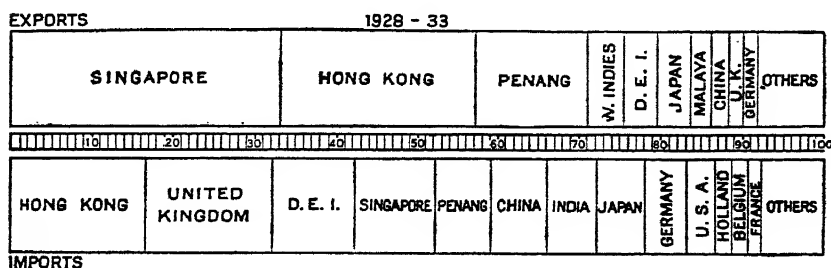


FIG. 244.—The direction of the foreign trade of Siam.

upon the rice harvest. A feature of interest is the rapid growth in the output of rubber from the Siamese portion of the Malay Peninsula.

## REFERENCES

An excellent book, essential to supplement the inadequate account here given, is A. W. Graham's *Siam, a Handbook of Practical, Commercial and Political Information*, 2nd Edition, 2 vols., 1924 (London). Like Burma, the poetic charm of Siam has inspired a large number of books, such as E. Young's *The Kingdom of the Yellow Robe*, Le May's *An Asian Arcady*, P. A. Thompson's *Lotus Land*, and Pierre Loti's *Siam*. For details of trade and economic development, reference should be made to the *Statistical Year-Book of the Kingdom of Siam*, and the British Department of Overseas Trade Reports. A very useful series of pamphlets is published by the Siam Government including two entitled *Resources* and *Natural Features*.

## FRENCH INDO-CHINA

French Indo-China has a total area of about 285,000 square miles and a population in 1931 of roughly 21,652,000. It is thus larger and more populous than 'British Indo-China' or Burma and considerably larger than Siam and with double the population. The French entry into Cochin-China dates from 1858. In the words of Monsieur Caillard, 'Nous y avons peu à peu établi notre domination, au détriment de l'autorité annamite, et, en dépit de quelques résistances et de quelques insurrections, le pays, en 1867, était complètement rattaché à la France.' Cambodia was added in 1884, Tongking after a longer and more costly conquest in 1884, Laos in 1893. The present limits date from 1907 when Indo-China absorbed a small area from Siam.

French Indo-China now comprises five areas, the Colony of Cochin-China, the Protectorates of Cambodia, Annam, Laos and Tongking. These units coincide in some respects with geographical units: Cochin-China and Cambodia include the rice-growing plains of the south; Annam the mountain ridge of the east and its coastal strip; Laos the country behind the Annamese Mountains and cut off by them from the sea; Tongking the Song Kai or Red River basin in the north.

Indo-China may also be divided in another way into three great economic units which are actually the hinterlands of the three main ports:

- (a) The hinterland of Saïgon, comprising Cochin-China, Cambodia, Southern Laos and Annam south of Cape Varella—the great rice-growing countries.
- (b) The hinterland of Tourane, comprising Central Annam between Porte d'Annam and Cape Varella—a narrow strip of coastland backed by high mountains.
- (c) The hinterland of Haiphong, comprising Tongking, Northern Annam and Northern Laos.

These divisions suggest themselves at a glance on the physical map.

Physically Indo-China<sup>1</sup> is divided into great basins by chains of mountains and highlands which form offshoots from the great plateaus of Yunnan and Southern China. One branch forms the northern border of the Red River basin and separates Tongking from China; the other separates the Red River Basin from that of the Mekong. In the north in the 'Haut Laos', many peaks of the latter reach over 6,000 feet and some of

<sup>1</sup> 'Inventaire général de l'Indochine: Structure et Géographie physique,' by Dussault (*Geog. Soc. of Hanoi*, 1927).

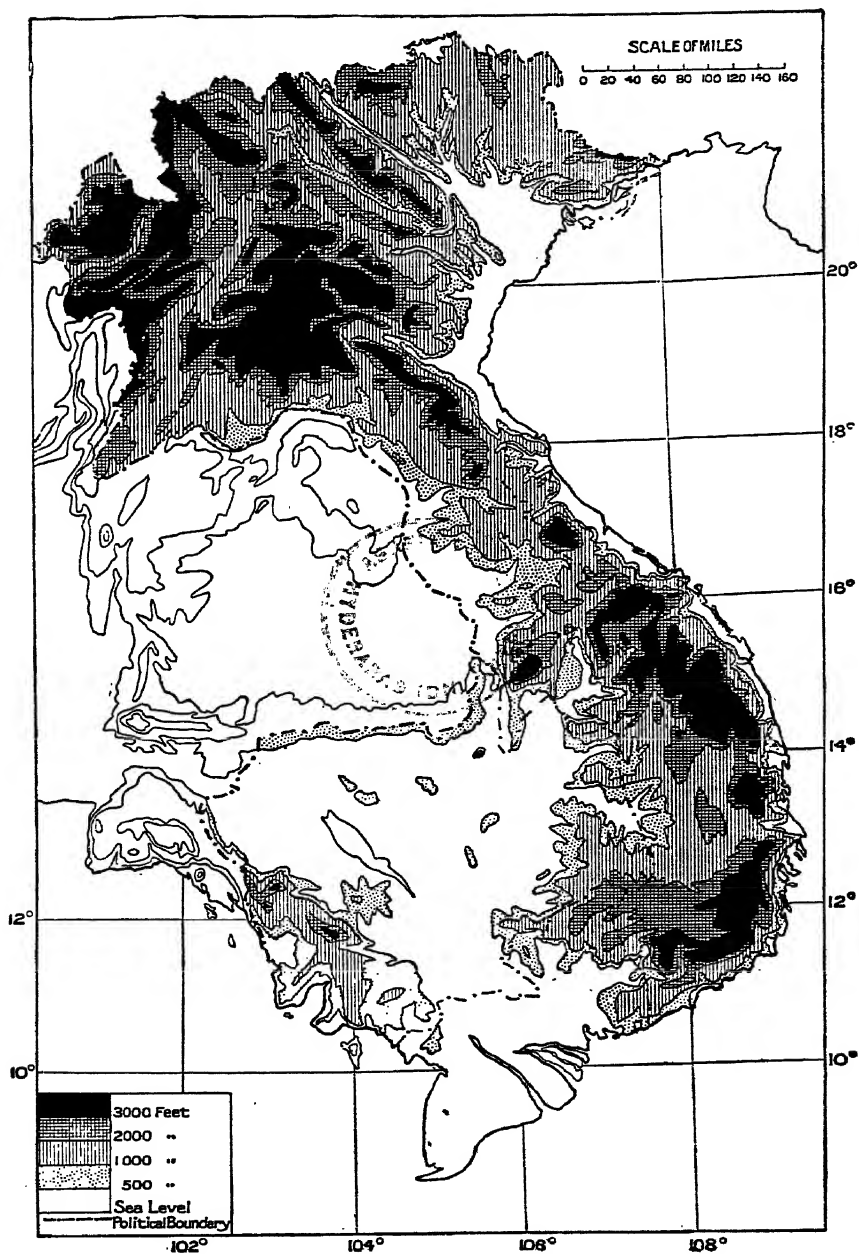


FIG. 245.—Physical map of French Indo-China.

the plateaus 4,000 or even 5,000 feet. It is from this centre that the great Annamite Cordillera is given off towards the south-east. This great chain runs parallel to the Annamese Coast and separates, in a very effective manner, Annam from Laos. The Chain is irregular in height and form ; by the spurs which it gives off it forms a series of compartments isolated from one another, or only connected by comparatively high passes. One of the latter is the so-called Annam Gate by which the Annamites of the north were able to invade the territory of their enemies the Cams or Cochinese of the south. It marks also the division between Northern and Southern Annam. Another pass is the 'Col des Nuages' between Hué and Tourane (1,500 feet). Communication across the main chain is very difficult : Annam and Laos are almost completely separated, the chief pass being that of Ailao between Hué and Savannaket on the Mekong. Several peaks of the Annamite Cordillera are over 6,000 feet. To the west the mountainous massif is prolonged into Laos by a series of plateaus, such as that of Cammon in the north and Bolovens (3,000-4,000 feet) in the south. The latter is continued westwards as the chain of Dangkak and eventually turns southwards along the coast of the Gulf of Siam.

Leaving the mountains, Indo-China includes the plains of Tongking in the north and the wide flat basin of Cambodia and the delta plains of the Mekong in the south. A remarkable feature of the Cambodian Plain is the great lake Tonlé Sap. The lake itself is connected with the Mekong by a channel (called also the Tonlé Sap) 40 or 50 miles long. For six months of the year, during the rains, the current is from the Mekong towards the lake ; for the other six months from the Lake to the Mekong. There is even a short period when the lake is affected by the tidal movements of the sea, 180 miles away. Economically the lake is important because it acts as a regulator of the floods of the Mekong.

Geologically the Annamite Cordillera is a continuation of the Yunnan massif and allied to the Indo-Malayan mountains : it is not a Tertiary chain.

In a general way, of course, the climate of Indo-China is dominated by the two great monsoons, the north-east monsoon from November to March which causes the dry season over most of the country—except Annam—and the south-west monsoon from April to October which causes the rainy season. Climatically there are really three provinces in Indo-China. In Northern Annam, Northern Laos and Tongking the dry season is relatively cold and the rainy season is marked by strong sea

reezes and storms. In Central Annam it is scarcely correct to say that the seasons are reversed: the conditions suggest rather comparison with Madras, for the rains are prolonged to January or February, whilst the heat is excessive in May, June, July and August. In Cochin-China, Cambodia and Southern Annam the temperatures are higher throughout the year and the hot season is especially trying. Since the political units coincide closely with geographical regions, it is convenient to take them separately.

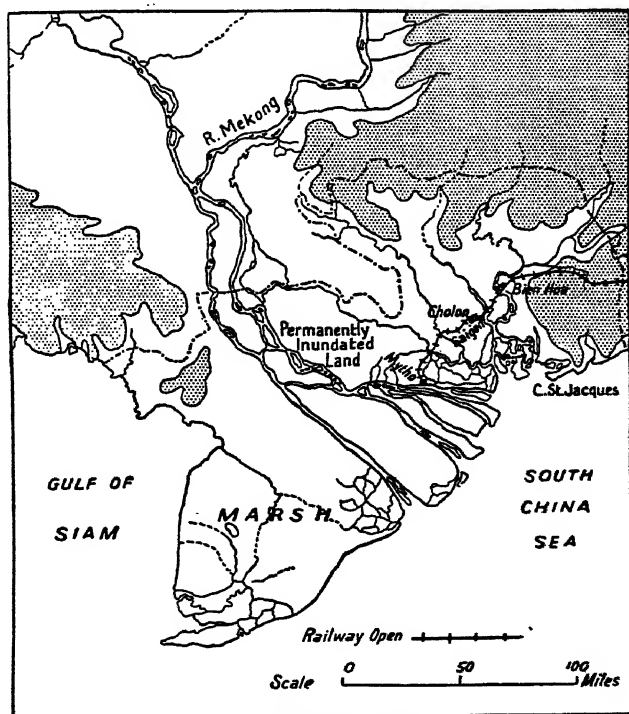


FIG. 246.—Cochin-China.

*Cochin-China* has an area of rather over 26,000 square miles and a population in 1932 of over 4,470,000—a relatively high density which bespeaks the fertile nature of the country. Cochin-China coincides broadly with the great delta of the Mekong, stretching north-eastwards to embrace some of the southern spurs of the Annamese Cordillera. Large areas of the delta are still occupied by unreclaimed marshes, but 36 per cent. of the whole area is classed as cultivated. Out of 5,980,000 acres cultivated rice occupies no less than 5,265,000—a proportion

which compares with that in the Irrawaddy Delta of Burma. The production of cleaned rice in 1932 was nearly 2,000,000 metric tons, or 35 per cent. of the total crop of the whole of Indo-China. Ploughing is done mainly by water buffaloes, of which there are 450,000; other animals include nearly 600,000 pigs and 11,000 horses, but it is only in the hills of the north that there are a few sheep and goats. Other crops include maize, sweet potatoes, beans, sugar-cane, tobacco, coconuts, betel-nuts, bananas, etc., and also some rubber and cotton. The output of rubber is increasing, and in 1926 exports amounted to 8,589 metric tons and in 1932 to 14,580 tons. River and coast fishing are actively carried on, and fishery products to the value of over £250,000 annually are obtained.

On the eastern fringes of the delta—not on the Mekong itself or one of its distributaries—is the town and port of Saïgon. Saïgon had, in 1932, a population of nearly 120,000, including 13,200 French, 500 other Europeans and 3,000 troops. It is served regularly by the liners of the Messageries Maritimes and Chargeurs Réunis Companies and by other lines. In 1932 nearly 340 steamers of 800,000 tons entered the port and Saïgon handled exports to the value of 812,000,000 francs (£9,000,000) and imports to the value of 553,000,000 francs (£6,000,000). The chief exports are rice, fish and fish-oil, pepper, cotton, copra, rubber and spices. Saïgon is, in many ways, a remarkable city. The French have transported to the Tropics an essentially French atmosphere in a way which England or Holland never do in their tropical possessions. Saïgon, apart from its populace, is a French provincial town. It has its *pavé* streets, dwelling-houses flush to the roads, its little modiste's shops, its street cafés where one sits at round marble-topped tables and sips an apéritif whilst watching the evening promenade, its big, flashy stores, and the inevitable Citroën taxis with high-pitched horns. The waiters are Chinese, but even they have adopted French mannerisms; the climate is tropical, but the Parisian hats and frocks are the mode.

Less than a dozen miles away is the equally interesting town of Cholon, with nearly 200,000 inhabitants, half of whom are Chinese. Cholon is the industrial centre, Saïgon the business and commercial centre and the port. There are in Cholon and Saïgon eleven rice mills—which turn out 3,000 tons of cleaned rice per day—as well as saw-mills, soap and varnish factories.

*Cambodia* has an area of 67,550 square miles and a population (1931) of 2,806,000. Over 2,400,000 are Cambodians, but there are also 148,000 Chinese, 176,000 Annamites, 61,300 Malays, and

5,100 Laotians. Cambodia is a saucer-shaped basin and in this respect compares with the basin of Eastern Siam to the north, but the soil is more fertile and the climate more favourable. Only 1,900,000 acres of the surface are under cultivation, but this is due to shortage of labour, not to infertility. The chief product is again rice, of which 800,000 metric tons were produced in 1926-30 and 140,000 tons exported via the mills of Cholon and the wharves of Saigon. Cotton-growing for export is extending; the production was estimated recently at 8,000 tons. An important crop, especially near Kampot, is pepper, and about 5,000 metric tons are produced annually. Other crops include tobacco, kapok, coffee, indigo and rubber. Cattle-breeding is a flourishing native industry, especially around Pnom-Penh. But an even more important native industry is fishing. In the wet season the overflow of the Mekong fills the great lake; in the dry season the lake slowly empties and leaves innumerable pools in which there are enormous numbers of fish suitable for salting and smoking. Much of the fish is exported to China via Saigon. Valuable forests are said to cover 10,000,000 acres in Cambodia.

The capital and chief town of Cambodia is Pnom-Penh, on the Mekong, below the junction of Tonlé Sap. It has a population of 96,000 and is accessible by ocean-going vessels; inland the Mekong and its tributaries afford a total of 875 miles of waterways in the high-water season and over 500 miles in the low-water season. Pnom-Penh is also the centre of the road system, there being over 1,400 miles of metalled roads. Roads run from Saigon via Pnom-Penh to the famous old ruins of Angkor, to Battambang and the Siamese frontier, and to the shores of the Gulf of Siam. On the latter coast is the little port of Kampot, but it is not accessible to ocean-going vessels.

The Laos territory is the least accessible and least developed part of French Indo-China, with an estimated area of 89,300 square miles and 975,000 inhabitants. It is a tangle of forested hills and plateaus; there are large areas of valuable teak forests, from which the timber is floated down the Mekong to Saigon. The soil of the valleys is fertile; minerals, including gold, lead, tin and precious stones, are found. The natural entry to the country is by the Mekong, but rapids bar continuous navigation at Khone. Steam launches ply on the upper reaches to Vientiane, the capital.

*Annam* is an Annamite kingdom under French protection. The area is nearly 40,000 square miles and the population (1932) over 5,000,000. The inhabitants are Annamites in the towns and along the coasts; various tribes of Moïs in the hilly tracts.

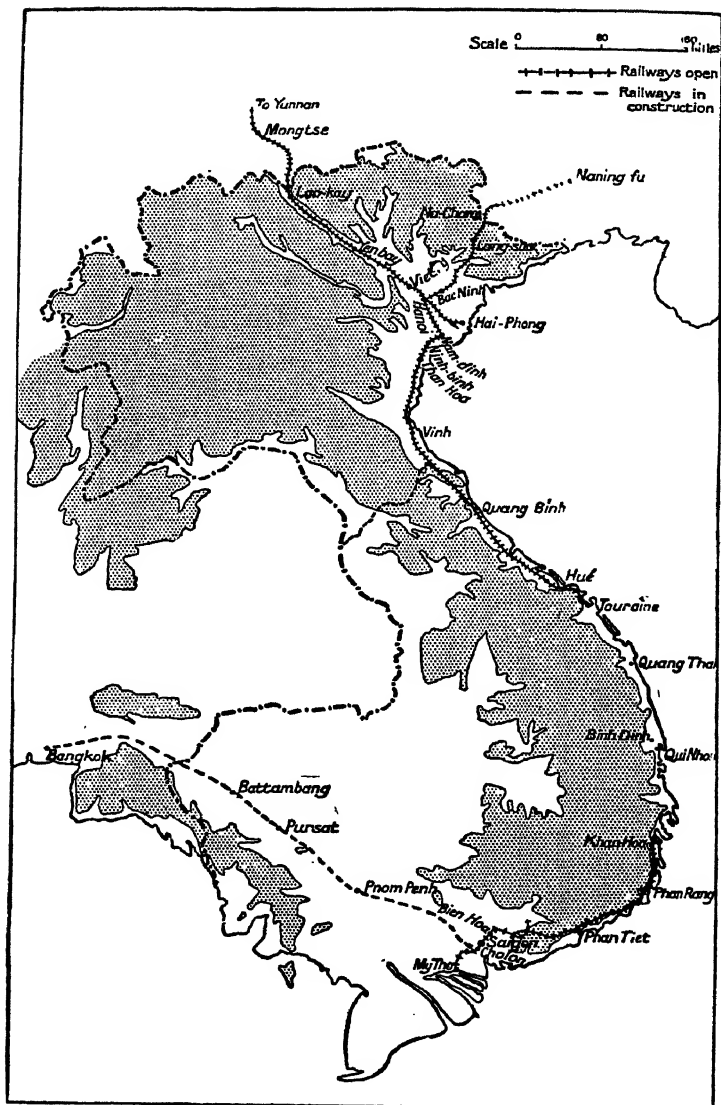


FIG. 247.—The railways of French Indo-China.

Note.—The railway from Bangkok to the Siamese frontier at Aranya Predasir was completed and opened in 1927-28, and the railway between Battambang and Pnom-Penh is now in operation. Land over 1,000 feet shaded. For Touraine read Tourane.



ference has already been made to the spurs from the cordillera which divide the coastal strip into a number of separate basins and render communication difficult. Hence the absence of a rough railway and the economic linking of Southern Annam with Saïgon, Northern Annam with Haiphong. Central Annam centres on Hué, the capital (32,000 in 1931), and its port Tourane, at the largest town is Binh-Dinh (147,000 in 1926). Agricultural products resemble those of Cochin-China and Cambodia, with the addition of silk and tea. The tonnage of shipping entering Tourane (1,000 tons in 1932) indicates the relatively small importance of Central Annam when compared with Cochin-China or Tongking.

EXPORTS		1929 - 32																				
R I C E														FISH	MAIZE	PEPPER	COAL	RUBBER	VARIOUS			
		10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170				
COTTON. GOODS	MANUFACTURES										VARIOUS											
	MACHINERY	METAL GOODS	IRON & STEEL	SILK GOODS	COTTYARN	PAPER	CIGARETTES	CARS	TYRES	WINES												
		10	20	30	40	50	60	70	80	90												
		10	20	30	40	50	60	70	80	90												
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of rice cultivation, owing to the limited areas of flat land. Other products are maize, sugar-cane, arrowroot, tea, coffee and tobacco. There is a large production of raw silk, most of which is used in the native weaving industry and only the surplus exported. The chief town of Tongking is Hanoi, a fine modern city of over 120,000 inhabitants and the capital of Indo-China. The bulk of the foreign trade passes through Haiphong, which, like Saïgon, is served regularly by several lines.

**Communications and Foreign Trade of Indo-China.** French Indo-China does not form a natural unit and a map of communications illustrates the reason—it being noted that the lines of communication themselves depend on the topography.

Figs. 248-9 illustrate the character of the foreign trade and the almost overwhelming importance of rice as an export. The comparison with Burma and Siam is interesting and suggests the real unity of the whole peninsula of Indo-China.

## REFERENCES.

French Indo-China is a large and interesting tract and the foregoing sketch gives but a very inadequate idea of the country. Amongst readily accessible works of reference is G. Caillard's *L'Indochine* (Paris: Notre Domaine Colonial, 1926). Since the above account was written an important general work has appeared, *Un Empire Colonial français: L'Indochine*, edited by G. Maspero (Paris: G. van Oest), 1929. See also J. Sion, *Asie des Moussons* (Paris: Colin, Géographie Universelle), 1929, and *Indochine*, 2 vols. (Paris: Société d'Éditions Géographiques, 1931).

## CHAPTER VII

### CHINA <sup>1</sup>

CHINESE territory extends through thirty-five degrees of latitude, from 18° N. to 53° N., and through no less than sixty degrees of longitude, from 74° E. to 134° E. though the name China is often loosely applied to the whole this vast area, covering four and a quarter million square miles, it is better to refer to Greater China when considering the whole, restricting China to China proper. Greater China comprises the following divisions:

	Square Miles.
China proper . . . . .	1,532,800
Manchuria . . . . .	363,700
Outer Territories:	
Mongolia . . . . .	1,367,953
Sinkiang or Chinese Turkistan . . . . .	550,579
Tibet . . . . .	463,320
Total . . . . .	<u>4,278,352</u>

Until 1907 China proper consisted of eighteen provinces, whilst Manchuria was considered a separate dependency. But the Imperial Decree of April 20th, 1907, the three Manchurian provinces were united as a single viceroyalty, the Viceroyalty of the Three Eastern Provinces. The Chinese hold over Mongolia is slight even in the days of Imperial China, and at the present time Mongolia is perhaps more closely linked with Soviet Russia than with the Chinese Republic. The reconquest of Chinese Turkistan by China in 1877 makes this territory more definitely Chinese, but Tibet is now virtually independent. It is obviously a mistake to extend the name China to include lands so loosely connected with China proper and so fundamentally different in respects. We shall here use China as meaning China proper.

In 1932, with Japanese assistance, Manchuria was declared dependent.

The area of China is roughly the same as that of the whole of the Indian Empire (1,805,332 square miles), and a very conservative estimate of the population of China would place it at approximately the same figure as that of the Indian Empire.

<sup>1</sup> Throughout this chapter the new official name Peiping may be substituted for Peking.



FIG. 250.—The provinces of China.

N.B.—Other maps in this volume show the old arrangement of provinces.

*Note.*—Recent events in China have not resulted in any alterations to the eighteen provinces of China proper except in the north and west. Recent maps, such as that accompanying W. A. Wong's *Mineral Wealth of China* (1927), far from recognizing Outer Mongolia as independent, show it divided into six 'provinces' (Tannu-Ola, Kobdo, Sassaktu, Sain-Noin, Tuchetu, Tsetsen); Inner Mongolia is organized into three (Suiyan, Chahar and Jehol). On the same map Kansu is much increased in size; a new division 'Sikang' embraces Western Szechwan and Eastern Tibet, and 'Kokonor' is another new division, covering North-eastern Tibet. Recently, however, Kansu and Kokonor have been separated into Kansu, Ningsia (in the north) and Chinghai (in the south-west). Chihli, with Kingchas as far north as the Great Wall, is now called Hopei. See *Geographical Review*, Vol. XX, 1930, p. 653.

53,000,000). A far larger proportion of the surface is mountainous and incapable of utilization than is the case with India, the result that the population in the fertile plains of China is far denser than in even the thickly populated Ganges Valley.

**Physiography.** Broadly speaking, China proper lies to the east of the great series of plateaus which constitute the heart of the continent of Asia. Excluding Manchuria, the country may be considered as consisting mainly of three river basins—the basins of the Hwang Ho, the Yangtze Kiang and the Si Kiang. These fundamental geographical divisions are useful because they correspond with the popular division of the country into North China, Central China and South China.

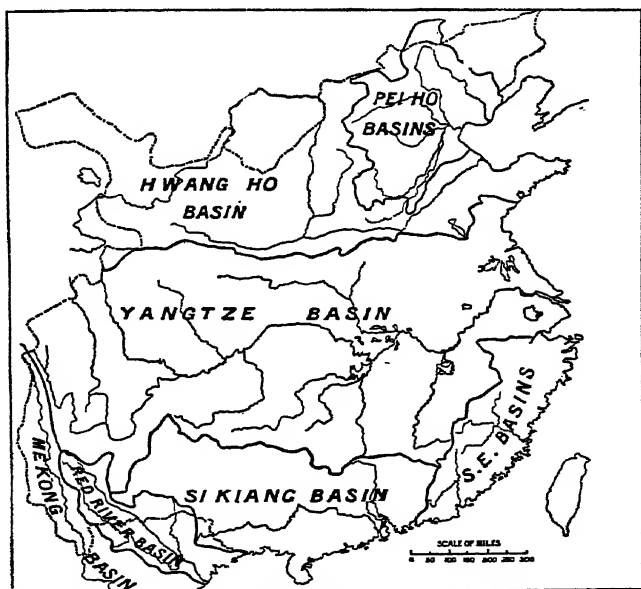


FIG. 251.—The partition of China between the principal river basins.

The Hwang Ho<sup>1</sup> and the Yangtze Kiang both rise amidst the mountains of the high plateau of Tibet, and with their upper courses outside the confines of China proper we are not, for the moment, concerned. The Si Kiang, a shorter river, may be regarded as wholly Chinese, for nearly the whole of its basin is within the confines of China proper.

In the north-west China includes a very considerable portion of what is, geographically, a part of the Mongolian Plateau,

<sup>1</sup> An excellent description of the Hwang Ho and its basin is given by G. Clapp, 'The Hwang Ho, Yellow River,' *Geog. Review*, Vol. XII, 22, pp. 1-18.

whilst the Hwang Ho itself makes a long northward detour outside of the confines of China proper into the heart of the plateau.

Separating the Hwang Ho and the Yangtze Kiang Basin is the Tsinling Shan, an important spur given off by the central mountainous core of Asia, continued eastwards as the Hwaiyangshan. Separating the Yangtze Kiang and Si Kiang basins is a broad tract of mountainous country sometimes referred to as the South China plateaus. In the south-west lies the Yunnanese Plateau; in the extreme west the boundary of China includes a large area of the Tibetan mountain system which may be referred to as the Mountain System of the Far West or the Szechuanese Alps. The old massif of the Shantung peninsula forms a separate physiographic unit in the east.

Manchuria falls naturally into three subdivisions—the old massif of the east; the central basin; and the western plateaus.

Whilst the broad division of China into the three great river basins and Manchuria is clear, the further separation of the country into smaller physiographic units or into natural regions as understood in other countries presents numerous difficulties. There is such a marked contrast between the broad valley floors, often simply wide stretches of alluvium, and the mountainous country which separates the basins that one seems justified in separating the two. Fig. 252 shows a rough subdivision drawn up by the writer some years ago.<sup>1</sup> The scheme agrees very closely with that suggested by Professor P. M. Roxby (see below).

*North China* includes:

- (1) The Loess Plateau of the north-west, through which the Hwang Ho flows in a deep, narrow valley. Northern Kansu, northern Shensi and most of Shansi are the provinces included.
- (2) The edge of the Mongolian Plateau, lying to the north of Peking in the northern part of the province of Chihli.
- (3) The Wei Ho Valley—the 'cradle of China'—which lies between the Loess Plateau on the north and the Tsinling massif on the south. This region occupies Central Shensi.
- (4) The Great Plain of North China, one of the most clearly defined of the physiological regions.
- (5) The Shantung Mountains, occupying the eastern two-thirds of Shantung Province. The ancient massif is divided into two halves by a marked valley (the Weihsien-Kiaochow Valley).

<sup>1</sup> Reproduced with slight modifications from L. D. Stamp, *The World; A General Geography for Indian Schools* (Longmans, Green & Co., 1926).

Between North China and Central China lies :

- (6) The Tsinling or Central Mountain massif, a broad ridge of mountains separating the Hwang Ho and Yangtze Kiang Valleys and occupying southern Kansu, southern Shensi, south-western Honan and north-western Hupeh.



FIG. 252.—The natural regions of China.

*Central China* includes :

- (7) The mountains of the Far West or the Szechuanese Alps, the fringe of the Tibetan Plateau, occupying the west of Szechwan.
- (8) The Red Basin, one of the most famous of the regions of China, occupying the greater part of the province of Szechwan. Near the eastern borders of the

province the mountains of the north approach close to the mountains of the south, and the Yangtze passes between them through the well-known Great Gorge.



FIG. 252A.—The natural regions of China according to Cressey.

- (9) The Central Basins of the Yangtze, separated from the Red Basin by the Great Gorge, centre around Hankow and include the most important part of the provinces of Hupeh on the north, Hunan and Kiangsi on the south.



- (10) The Yangtze Delta Region, lying in An-hwei and Kiangsu, is continuous on the north with the Great Plain of North China.

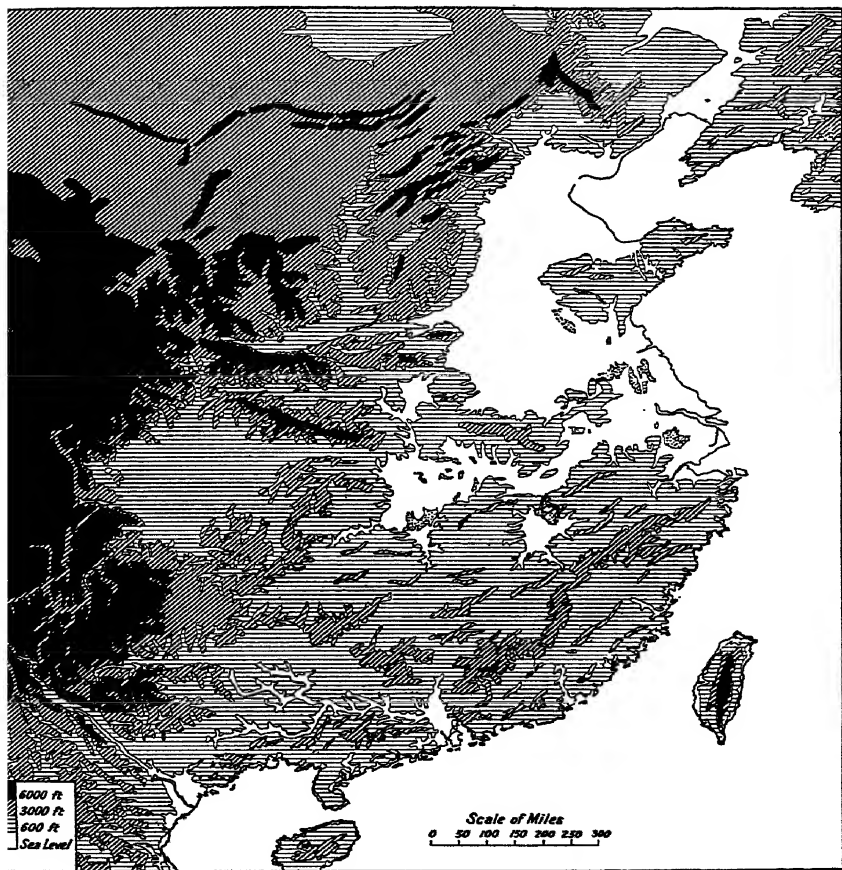


FIG. 253.—Physical map of China.

s map shows clearly the extensive northern plain, the Red Basin and the central basins of the Yangtze, but demonstrates the comparatively small area of flat lowland—contrast India.

Between Central China and South China lie :

- (11) The Plateaus of South China, a complex region, having as a common feature throughout merely the rugged nature of the country and the geological structure of the ancient massif.

*South China* includes :

- (12) The Plateau of Yunnan occupying the province of Yunnan in the south-west.
- (13) The Si Kiang Valley and Delta, occupying the province of Kwangsi and the western half of Kwangtung.
- (14) The South-east Coast, occupying Eastern Kwangtung, Fukien and Chekiang.

*Manchuria* includes :

- (15) The Eastern Highlands and the Liaotung Peninsula, consisting of ancient rocks and geologically a continuation of the Shantung Peninsula.
- (16) The Central Manchurian Lowlands.
- (17) The West Manchurian Plateau, representing an extension of the Mongolian Plateau.<sup>1</sup>

In his important work, *China's Geographic Foundations*, published in 1934, some five years after the first edition of the present book, Dr. G. B. Cressey uses a scheme of regional divisions very closely comparable with those here defined. Cressey's divisions are shown in Fig. 252A and the following tabular statement shows the comparison with the regions described on pages 513 to 537.

STAMP	CRESSEY
The Loess Plateaus of the North-west.	} The Loess Highlands.
The Wei Ho Valley.	
The Mongolian Plateau edge.	The Khingan Mountains.
The Great Plain of North China.	The North China Plain.
The Shantung Mountains.	The Mountains of Shantung.
The Tsinling or Central Mountain massif.	The Central Mountain Belt.
The Szechuanese Alps.	The Tibetan Borderland.
The Red Basin.	The Red Basin.
The Central Basins.	} The Yangtze Plain.
The Yangtze Delta.	
The Plateaus of South China.	The South Yangtze Hills.
The Plateau of Yunnan.	The South-western Tableland.
The Si Kiang Basin.	The Hills of Liangkwan.
The South-east Coast.	The South-eastern Coast.
The Eastern Highland and Liaotung Peninsula of Manchuria.	Mountains of Eastern Manchuria.
The Central Manchurian Lowlands.	The Manchurian Plain.
The West Manchurian Plateau.	The Mountains of Jehol.

<sup>1</sup> The scheme of natural regions used by Prof. P. M. Roxby is set forth in 'The Distribution of Population in China', *Geog. Review*, Vol. XV, 1925, pp. 4-5, and also in an earlier paper, not known to the present writer at the time the above scheme was drawn up, entitled 'Wu-Han: The Heart of China', *Scot. Geog. Mag.*, Vol. XXXII, June, 1916. China is divided into seven regions—N.W. Plateaus, Plain of North China, Highlands of Central China, Red Basin, Region of Yangtze Gorges, Central Basin, South China Plateau.

**Geology and Minerals.**<sup>1</sup> Reference to Fig. 6 shows that forming Shantung and underlying the North China plain there is an ancient massif, mainly of pre-Cambrian rocks. Folded against this on the west are rocks of various ages. South China consists of a great block of country with a core of Archean rocks. Fundamentally China may be considered as consisting of four main structural units:

- (a) The Archean massif of the north-east, the 'Faîte primitif' of De Launay.
- (b) The basins of the north-west.
- (c) The South China block.
- (d) The mountains of the Far West.

The Archean massif of the north-east is best seen in Korea, Liaotung and East Shantung, where pre-Cambrian crystalline rocks occupy most of the surface. On the western flanks in-folded sediments of Palæozoic age occur, and in places include patches of Permo-Carboniferous coal-measures. West Shantung may be considered as a separate sub-region, owing to the greater thickness of Palæozoic sediments and to the fact that block faulting has warranted Suess's description of the area as a 'shattered horst'. The alluvial plain of North China may be regarded as consisting fundamentally of a down-folded or down-faulted block of the Archean massif.

The Basins of the North-west are important because of the

<sup>1</sup> Owing to the activities of the Geological Survey of China and other investigators, discoveries of fundamental importance in the interpretation of the geology of China have been made in recent years. A concise summary in English of the state of knowledge in 1920 is J. S. Lee's 'Outline of Chinese Geology', *Geological Magazine*, 1921. This may be supplemented and brought up to date from A. W. Grabau's great work *The Stratigraphy of China* (*Geological Survey of China*, Vols. I and II, 1926-8). Mention must be made of Richthofen's famous classic *The Geology of China* (Berlin, 1882-1912), in which he advanced the sub-aerial origin of loess. A modern paper of wide interest is J. S. Lee's 'Evolution of the Earth's Surface-features' (*Bull. Geol. Soc. China*, 1927). Information concerning the mineral wealth of China will be found in W. Smith's *Geographical Study of Coal and Iron in China* (University of Liverpool Press, 1926). A brief summary of the present state of mining in China, by provinces, without any geological or geographical introduction, is given in W. A. Wong's *Mineral Wealth of China* (Shanghai: *The Commercial Times*; London: Luzac, 1927). The work of Heanley, Williams and Schofield on the geology of Hong Kong (published by the Colonial Office) has an important bearing on the structure of southern China as a whole. See also H. F. Bain, *Ores and Industry in the Far East* (Research Publications of the Council on Foreign Relations, New York, new edition 1933); and J. S. Lee, *Geological Magazine*, Aug. 1929. There is an excellent chapter on Minerals in Cressey's book already quoted, and an authoritative memoir on Iron Ores has been published, with an atlas, by the Geological Survey of China.

enormous areas of coal-measures which they include. To the north and west of Peking lie series of anticlinal and synclinal ridges, trending north-east to south-west, that is, parallel to the edge of the sunken portion of the Archean massif. The anticlines have pre-Cambrian cores, but the synclinal basins are filled with Palæozoic and Mesozoic sediments and the folding apparently took place in the Jurassic. Richthofen and Suess have referred to this succession of folds as the Peking Grid, occupying northern Chihli and northern Shansi. Southwards, in southern

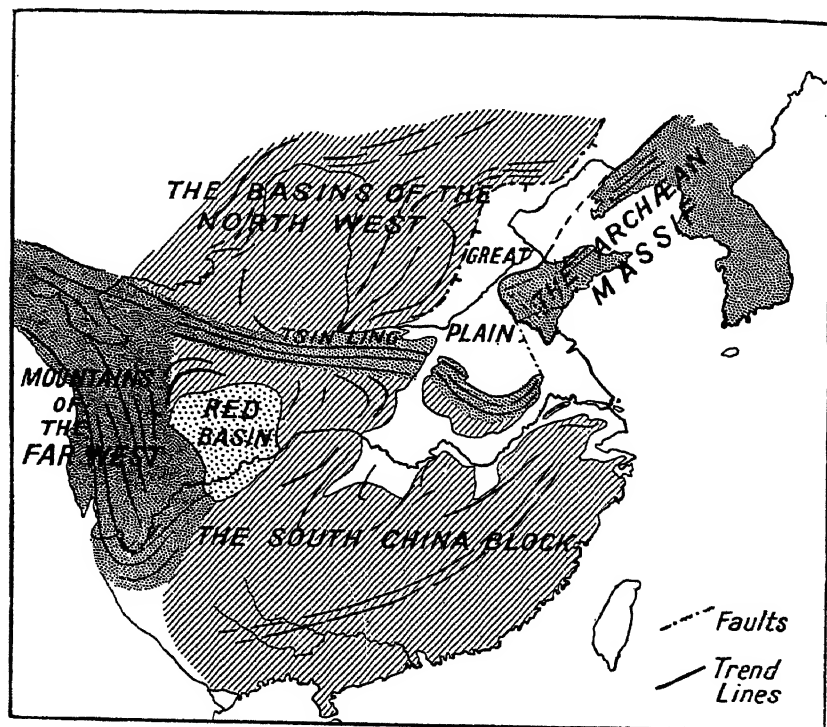


FIG. 254.—The structure of China.

Shansi, the folds broaden out and the sediments in the synclinal basins are often but slightly folded. This is the case with the huge coal basin underlying the Tsin Ho Plateau. Further west lies the huge basin of northern Shensi, bounded on the south by an anticline to the north of the Wei Ho Valley. Coal-measures of Permo-Carboniferous and possibly also of Jurassic age probably underlie the whole plain, but the thick mantle of loess—often exceeding 1,000 feet—obscures the structure.

*The South China Block* has its grain running approximately

om north-east to south-west or, more correctly, parallel to the coast of South-east China. The coast itself has been supposed by some to be determined by a major line of faulting. Well-marked synclines, important because they are often occupied by coal-measures, follow the dominant trend. It is very probable that the South China Block acted as a stable block during the Tertiary earth movements, but it has recently been shown that the block is not as old as was formerly supposed. In the new territory of Hong Kong sediments of Cretaceous age are involved in the folding; the granites of the region are probably of late Cretaceous age. Thus the age of the South China mountains is comparable with that of the Indo-Malayan

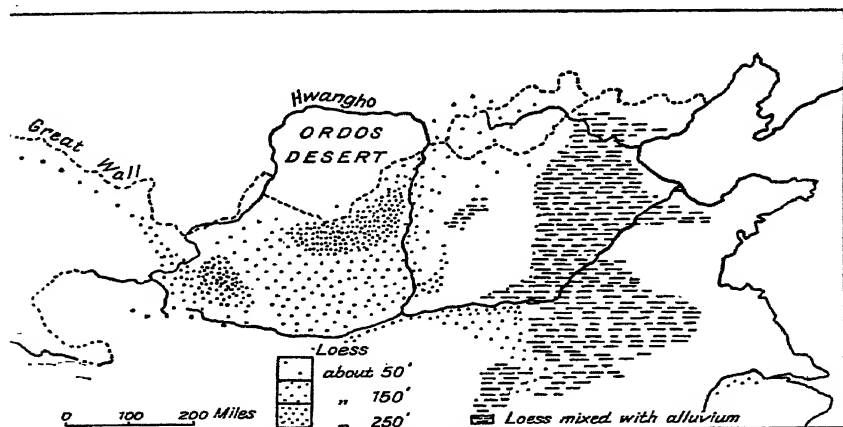


FIG. 255.—Loess of North-west China.

mountains. There is no doubt, however, that the main grain of the country was determined earlier. In the Mesozoic great lake-basins were formed in Szechwan and Central China. In the Szechwan Basin were laid down not only Rhætic-Liassic coal-measures but the red Cretaceous sandstones which give the Szechwan Basin its familiar name.

The Mountains of the Far West are believed by many to be of Alpine or Tertiary age, but to enter into this fascinating but dangerous subject is beyond the scope of the present work.

No account of the geology of China, however brief, would be complete without reference to the loess of the north-west. Sprinkled over the countryside as though by a giant flour-sifter, a veneer of fine wind-blown silt blankets over a hundred thousand square miles of the north-western provinces. So

writes Dr. Cressey, whose map of the distribution of loess was used as the basis for Fig. 255. The material seems to have been derived from the Gobi, which is now quite free from fine silts, and in a smaller degree from the Ordos Desert.

**Minerals.** China is by nature a country isolated by barriers of mountains, desert, tempestuous seas and the widest of the oceans. For much of her history she has been out of touch with the rest of the world, self-centred and by design closed to foreigners. Chinese goods which reached the outside world were those of great value for small bulk—rare silks, finely carved jade or exquisite specimens of porcelain. China—so self-centred that she styled herself the Middle or the Central Kingdom—became famed as a land of hidden treasure and vast wealth. The realization that China is actually a country poor in many natural resources, including minerals, and that the mass of her people live in incredible poverty, has come but slowly. Modern geological exploration over the last half-century has brought a succession of disappointments. In the noble metals China is particularly poor. Platinum is unknown; placer and reef gold are found but rarely and in small quantities in the high mountain regions of the north and west. Although silver is a noble metal in China and the chief medium of exchange, the home production is very limited. For more than two thousand years the Chinese have hunted for silver ores and even in the remotest areas—such as the still little known Chinese-Burmese borderland in Yunnan—have worked tiny argentiferous veins. Even the jade—of which it is the ambition of every Chinese to possess at least one piece—comes from Burma.

Copper has long been worked, especially in Yunnan, from which province comes also the tin which normally ranks as the leading mineral export. Tungsten and antimony are the two metals in which China is particularly rich. They occur in the eastern part of the Nanling Range, especially in Hunan. The tungsten occurs as wolframite and scheelite and large quantities were produced during the Great War, large reserves remaining. Since 1908 China has produced over 60 per cent. of the world's antimony (occurring as the mineral stibnite) and the reserves are large. Small quantities of other metals—zinc, lead, molybdenum and bismuth—have been worked and a little oil is obtained in Shansi, but China is unlikely to have important oilfields. There is a large production of salt.

Apart from these, coal and iron ore are the only minerals worth serious consideration.

**Coal.** According to the estimates published by the International Geological Congress of 1913, China's resources of coal

re estimated to be 994,987,000,000 tons against 747,508,000,000 is for the whole of Europe. The figures for other countries the world were as follows:

United States . . . . .	3,838,640,000,000 tons
Canada . . . . .	1,234,270,000,000 „
Siberia . . . . .	173,880,000,000 „
Japan . . . . .	7,970,000,000 „
United Kingdom . . . . .	189,530,000,000 „
Germany (post-War boundaries) . . . . .	148,220,000,000 „
World Total . . . . .	7,397,550,000,000 „

is estimate of Drake's for China takes into consideration only seams 1 foot and over in thickness and down to depths of up to 4,000 feet. In 1921 the Geological Survey of China published their first official estimate. Considering only seams of 3 feet and over and only down to 3,000 feet, they arrived at a total of 23,435,000,000 tons—only *one-fortieth* of Drake's figure. But in recent years the Survey have carried out detailed studies and the latest estimate is nearly 250,000,000,000 tons—of which 50 per cent. is in the loess plateaus of Shensi and Shansi. The following details have been supplied by Dr. J. S. Lee of the National University, Peiping, who also provided the map, Fig. 5A. China's coalfields fall into eleven groups, and the coals range in age from Lower Carboniferous to Tertiary. The Permian and Liassic coals are economically the most important—the latter are thus somewhat younger than in most parts of the world—the Lower Carboniferous and Tertiary coming next. Except in the Fushan field of Manchuria, where good bituminous coal of Tertiary age occurs, the coals of that period are usually better described as lignites. The practical absence of oil in China gives special importance to the problem of obtaining oil from Chinese coals and some of the poorer coals may prove significant in this respect.

(1) *The Fields of Shansi and Shensi.* This is undoubtedly the most important group. The structure of the region is simple: there are three blocks arranged longitudinally, the middle block being sunken and itself divided into three basins—the Fenho in the south, the Ningwu in the centre, and the Tung in the north. In each case coals of more than one age occur below younger sediments. The eastern block is one vast field in which the seams are but gently folded and where conditions may be compared with Pennsylvania—except that the field is as yet untouched by modern methods of mining. The western block has a centre ridge of older rocks, the coal seams dipping away on either side—the field covering 40,000 square miles. In each field numerous seams occur—some inconveniently

thick, ranging up to 30 feet. In the native workings the only coal removed is in large lumps which can be used as an adequate burden for a single coolie. Not only is this first group of coal-

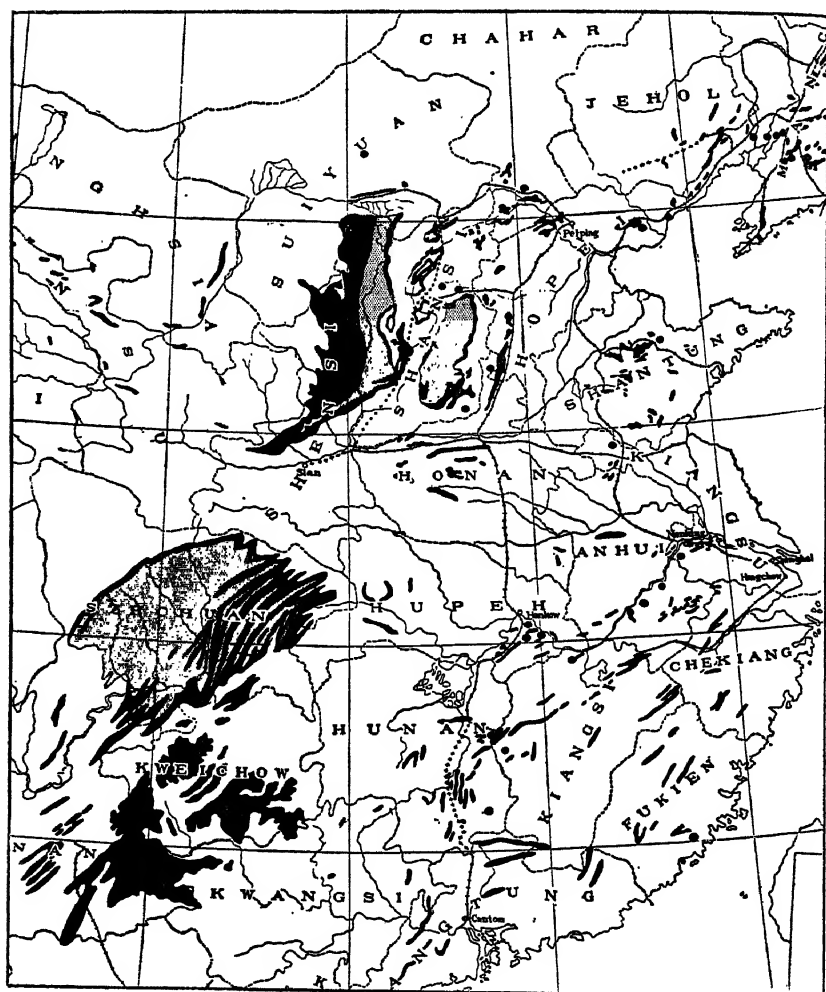


FIG. 255A.—The coalfields of China.

fields, with an estimated reserve of 200,000,000,000 tons, easily the most important in China economically, but it is politically the most significant being in the extreme north of China proper and on the borders of Mongolia and accessible from Manchuria.

(2) *The Peiping Group.* At the foot of the Taihangshan



nge or eastern edge of the Shansi Plateau—that is, along the margin of the North China Plain, from Peiping southwards to Shan-si—there is a long line of small coal basins, those with considerable reserves exceeding forty in number. They are downfolded blocks of the same character as the plateau above and the coals may extend far under the alluvium of the Plain. Owing to the accessibility from the Peiping-Hankow railway and the excellent quantity of the coal (including much anthracite), work is active. The Peking Syndicate, a British concern, operates the Siuwu district of northern Honan, the Kailan Mining Administration (Sino-British) in the Kaiping Basin, where there is a large modern plant for recovering of by-products in coking.

(3) *The Shantung Group.* This group comprises several fields in Shantung, northern Kiangsu and north-eastern An-hwei, with several modern mines. The coals are bituminous.

(4) *The Northern Group.* This group includes various fields in the provinces of Suiyan, Chahar and Jehol—within or near the Manchurian border. The fields are in the mountain zone, the coals poor and often highly folded.

(5) *The Manchurian Group.* These fields are estimated to have a reserve of 5,000,000,000 tons—much of moderate quality but with high ash content and low in fixed carbon.

(6) *The North-western Group.* These fields lie in mountain-keed basins and because of enormous difficulties of transport little attention has been paid to them.

These six groups of fields all lie in northern China, north of the Tsinling Range, and include all the most valuable areas. North of the Tsinling line conditions are quite different—the strata are usually highly disturbed, the small fields occur in tectonic basins involved in sharp folds or separated into small patches. The coals are usually poor and the seams thin.

(7) *The Red Basin.* A single seam of Jurassic coal is believed to occur almost throughout the basin, but it is usually only about 6 inches in thickness. More important is the Permian coal to the south of the basin.

(8) *The Central Hunan Group,* with the fields of Hupeh and Kiangsi. There are various small fields with coal of moderate quality.

(9) *The South-eastern Group.* Various small fields occur along the south-eastern coast and in the lower Yangtze Valley, but are not thought to be of much importance.

(10) *The Kwangtung-Kwangsi Group.* These small fields are only thin seams of inferior coal.

(11) *The Yunnan Group.* This area is highly disturbed and the small scattered fields are of doubtful value.

Summarizing the coal reserves of China, it is found that, according to present estimates, 80 per cent. occur in the Shen-Shan Plateau; 1.8 per cent. only in Manchuria and Jehol; 4.8 per cent. in the remote north-west, leaving only 13.4 per cent. for the rest of China, of which a total of 8.4 per cent. only is accredited to southern China.

The annual output of coal in China is estimated at 30,000,000 tons: a third from native mines, rather less than a third from more modern workings and over a third from two areas only—the Kailan plant and the Japanese-owned Fushun mines of Manchuria. The importance of a field is determined at present by its accessibility to modern forms of transport and to the stability or progressiveness of the operating concerns.

*Iron Ore.* The extravagant statements regarding the wealth of China in iron ore have been proved to have little foundation, as the recently published memoir of the Geological Survey of China makes clear. According to Dr. Lee, 'calculating on the basis of metallic iron, there are some 368,000,000 tons of that metal in reserve; of this, probably only 166,000,000 tons are actually fit for modern methods of mining and smelting . . . it is quite clear that China can never be an iron-producing country of any importance. Within the last 30 or 40 years 90 per cent. of the reserve has passed to Japanese control.'<sup>1</sup> By far the most important iron-ore deposits are the hæmatite-magnetite ores of Archean age of Manchuria, smelted by the famous Anshan Ironworks. A small reserve of similar ore occurs in north-eastern Hopei within the Great Wall. The largest deposit of high-grade ores (50 per cent. metallic iron) in China proper—within the Great Wall—is a hæmatite occurring in the Hsuanhua and Lungkuan districts in north-western Hopei. The iron industry in China may perhaps be called the oldest in the world, but the small scattered deposits of iron ore used by the early smelters are in general useless as a basis of modern industry. But in the central and lower Yangtze valley are a number of considerable deposits of first-grade ore—developed as a result of contact metamorphism in association with intrusive masses of granodionte. The most famous of these deposits are the Tayeh deposits near Hankow.

*Soils.* The first modern study of soils is that by Shaw.<sup>2</sup> He finds the major soil regions are determined by climate, with leached, non-calcareous soils in the south (associated with rice

<sup>1</sup> This is the Chinese view and is held by some to overestimate the importance of Manchuria.

<sup>2</sup> C. F. Shaw, 'The Soils of China', *Geological Survey of China*, 1930. To these nine types may be added the loessic soils of the plateau.

ivation) and the generally calcareous soils of the north associated with wheat and Kaoliang). Within the broad climatic belts, the type is determined by the geological origin of the material, and erosion or deposition is so active that most soils are immature. Shaw distinguishes nine soil regions:

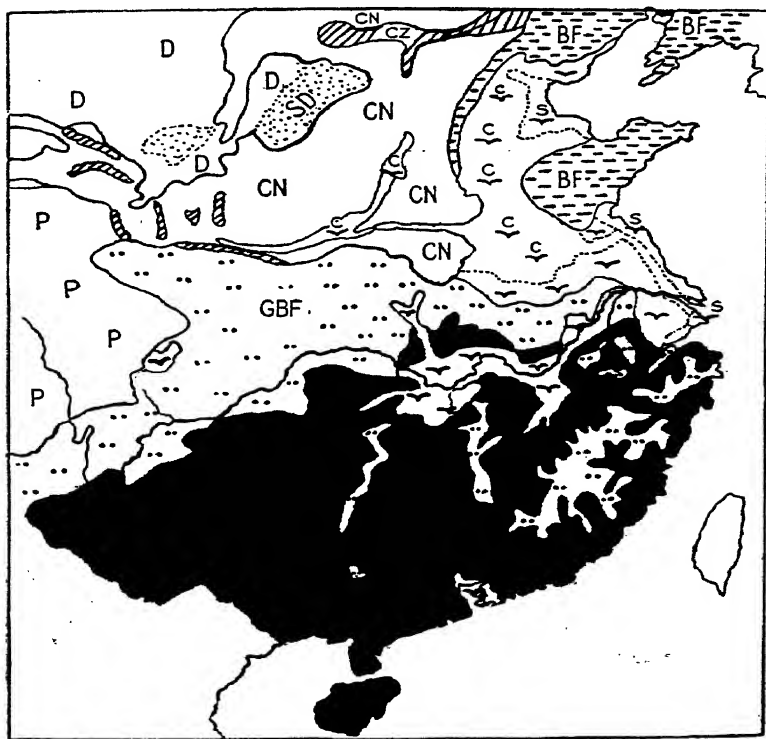


FIG. 255B.—Simplified soil map of China.

(After James Thorp, 1935.)

Podzols; **BF** = Brown Forest Soils; **GBF** = Grey-Brown Forest Soils; **Black** = Red Soils, often lateritic parent materials; **CZ** = Chernozems; **CN** = Chestnut Soils; **D** = Grey Desert Soils; Sand dunes; ~ = Alluvium (c, Calcareous; s, Saline).

This scheme is a later and more complete one than that of Shaw described in the text.

. The *Upland Red Soil Region* of the south with soils of a lateritic character eroding severely when the land is cleared of natural forest (cf. India).

. The *Claypan Soil Region* has reddish brown soils with a heavy clay subsoil and occurs mainly on the northern side of Yangtze. (GBF of Fig. 255B).

3, 4, 5. The *Soil Regions of the Middle Yangtze Flood Plains*,

*Yangtze Delta* and *Hwai River Valley* are deep silt loams, clay loams and clays subject to flooding and poorly drained, now calcareous and devoted to rice.

6. The *Brown Soil Region* coincides largely with Shantung and Jehol and is naturally a varied area. (BF of Fig. 255B).

7. The *North China Plain Alluvial Soil Region* has deep,

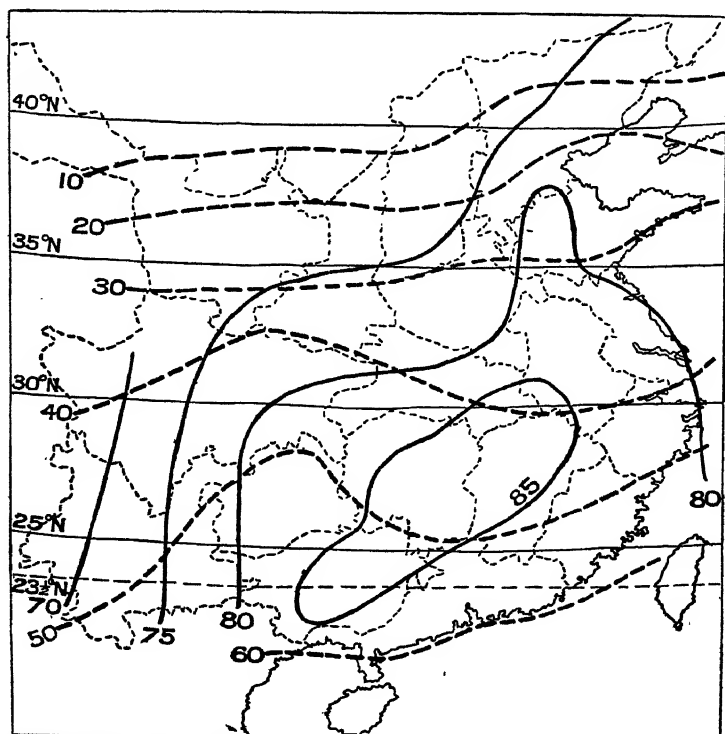


FIG. 256.—The climate of China—January and July isotherms.  
(After Koeppé and Bangs.)

*fine-textured* soils, calcareous and sometimes saline, poorly drained and liable to flooding but generally productive.

8. The *Old Delta Soil Region* is believed to include more saline soils.

9. The *Sajong Soil Region* of the southern part of the North China Plain is characterized by an horizon of calcareous concretions or *sajong* in the subsoil (cf. Kankar soils of northern India).

**Climate.** It is only possible to give the most general account of the climate of China, for detailed records are few and mostly

ned to coast stations, whilst observations by travellers in interior are of a general nature and not infrequently incon-

*Winter Conditions.* In winter atmospheric conditions in a are dominated by the mass of cold heavy air over the t of the Continent. The barometric gradient over China is o, so that strong, cold winds blow outwards towards the sea.

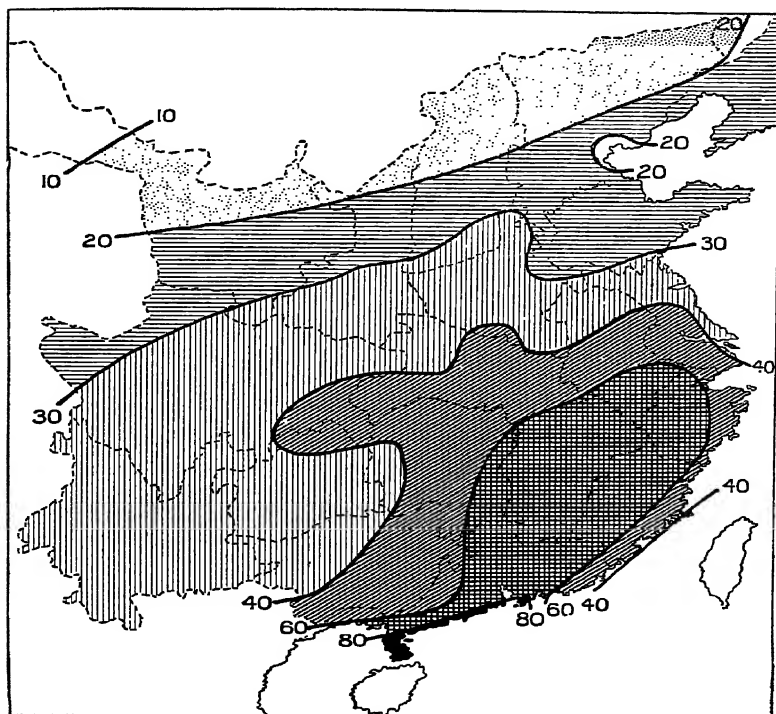


FIG. 257.—The climate of China—annual rainfall in inches.

(After Koeppel and Bangs.)

gh warmed somewhat by their descent from the plateaus, winds are very cold, especially over Northern China, e they are at the same time particularly strong, giving rise e well-known and hated dust storms. Stormy weather in China Sea is a further result. The general direction of this er monsoon is from the north-west in Northern China, from orth in Central China and from the north-east in Southern a, the direction remaining comparatively constant. The

effect of the cold winter winds is well seen in the direction of the January isotherms. The whole of Northern China is below freezing in winter, the January isotherm of  $32^{\circ}$  F. reaching its southernmost limit ( $32^{\circ}$  North) in the Northern Hemisphere. On the hills, occasional frost is not unknown even at Hong Kong. On the whole the interior basins are warmer than the coasts—thus Chengtu in the Red Basin has a January average temperature of  $44^{\circ}$  as against  $38^{\circ}$  at Shanghai on the coast in

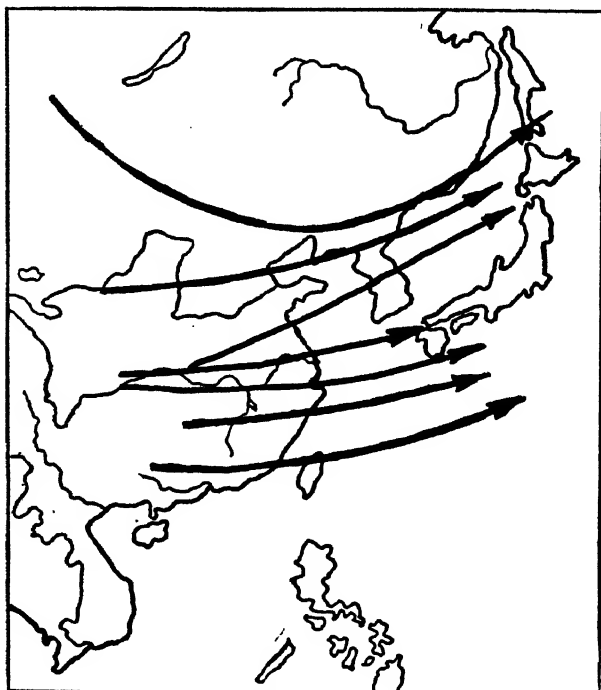


FIG. 257A.—Cyclonic storms (1893-1924).

the same latitude. In the Red Basin frost and snow are rare, but are usual at Shanghai. In North China even the largest rivers are generally frozen over in winter. The winter winds of China, descending from the deserts of the interior, are, of course, very dry. The skies are almost cloudless and there is no rain. The winds are strongest in December, January and February, and it is during those months that Peking suffers from the scourge of dust storms. By April the high-pressure system over Central Asia is breaking up, and winds over China are light and variable. Occasionally, however, the dry land winds continue

North China right on through the hot months of April May into June with disastrous results to the crops. In China the rainlessness of the winter months is well illustrated by Peking, where 91 per cent. of the rain falls in the months May to September, inclusive. The periodicity is of the character in the Si Kiang Valley of South China, but in general China, especially near the coast, there is considerable precipitation in winter. It is believed by some that these winter rains are due to cyclonic disturbances originating in the Red

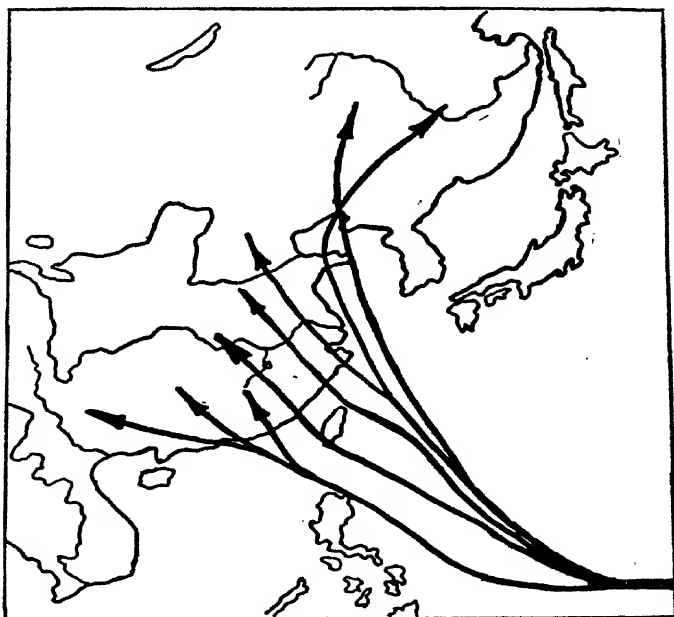


FIG. 257B.—Typhoons, 1893-1924.

and moving down the Yangtze Valley. The winds which attend the arrival of one of these depressions are easterly and south-easterly, that is, from the sea, and are therefore rain-bearing. The winds in the wake of the depression are very strong, being the north-westerly winds reinforced.

*Summer Conditions.* After the break-up of the high-pressure system over Central Asia in April, depressions form in the interior. When the summer monsoon commences, continuing until September. All over China the prevailing winds are south and south-west, warm and moist. The summer monsoon winds in China are as strong or as constant as the winter winds—a direct

contrast with India, where the protective mountain wall cuts off the strong, cold winter winds which would otherwise blow from the heart of Asia. May to September is the rainy season. Rainfall is heaviest in the south and east, the 40-inch isohyet running along the northern border of the Yangtze Valley. North China is drier, Peking having about 25 inches. The moderating influence of the warm moist monsoon winds is well seen in the course of the July isotherms. There is little difference between

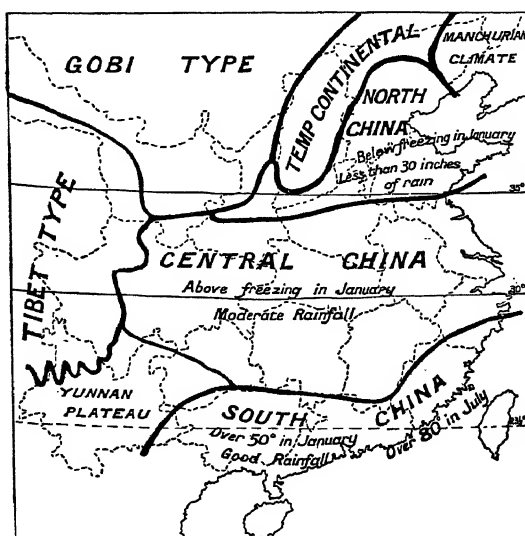


FIG. 258.—The climatic regions of China.

the July temperatures of Peking (79° F.), Shanghai (80° F.) and Hong Kong (82° F.). In Northern and Southern China the rainfall reaches a maximum in July and decreases as the monsoon weakens—a typical monsoonal régime. In Central China, however, conditions are again disturbed by shallow depressions moving down the Yangtze Valley, and there are two summer maxima—June and August. The August maximum is connected with the typhoons, which are particularly dangerous off the coast of Central China during that month.

CLIMATIC REGIONS.<sup>1</sup> The tripartite division of China based

<sup>1</sup> Climatic changes in other parts of Asia are dealt with elsewhere in this book. Concerning China in historic times, see Co-Ching Chu, 'Climatic Pulsations during Historic Times in China', *Geog. Review*, Vol. XVI, 1926, pp. 274–282. For a summary account of the climate of China, see C. E. Koeppe and N. H. Bangs, *Monthly Weather Review*, Vol. LVI, 1928, pp. 1–7; also Co-Ching Chu, *Ibid.*, Vol. XLIV, pp. 276–281.



Physiographic considerations is corroborated by climatic conditions, and three main climatic provinces may be distinguished. North China has very cold rainless winters (below 32° in January), with very strong winds, bringing clouds of snow, and hot, wet summers, very as warm as in South China. The rainfall, under 30 inches, is less than in Central South China.

Central China has cold winters but mean sea-level temperatures are above freezing. The principal rainy season is in summer, but local cyclonic disturbances may cause a considerable winter rainfall. The interior in winter is warmer than the coast.

South China has a tropical monsoon climate, comparable in many ways with that of the Yangtze Basin, but with rather milder winters. The winters are, however, sufficiently cold to interrupt vegetative growth, but more than one crop a year becomes possible.

In addition, as shown in Figure 258, China includes areas of other types of climate:

*Yunnan Plateau* with a local monsoon climate modified by altitude, but with a small annual range.

*Tibet Type*—covering the region over 10,000 feet (see Figure 257, under Tibet).

*Gobi Type*—temperate desert (see Figure 256, under Mongolia).

*Mid-Latitude Continental or Steppe Type*—grassland or steppe. Since the first edition of this book was written, a schematic climatic regions for China has been drawn up by Chu Coching.<sup>1</sup>

*The Climatic Provinces of China.* Memoir No. 1, National Research Institute of Meteorology, Nanking, 1930.

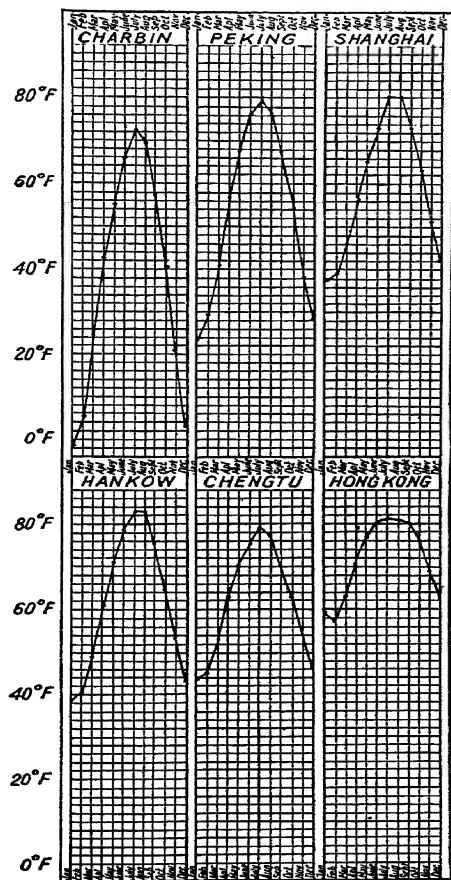


FIG. 259.—Temperature graphs of typical Chinese towns.

These have been shown in Fig. 259B, and it will be noted that there is close agreement with the above scheme. Reference should also be made to Thornthwaite's divisions, given in Chapter III.

**Natural Vegetation.**<sup>1</sup> In few countries of the world has the natural vegetation been removed as completely as it has over much of China. His devotion to agriculture has not taught the Northern Chinese anything of forestry. The shortage of fuel is second only to the shortage of food, and all readily

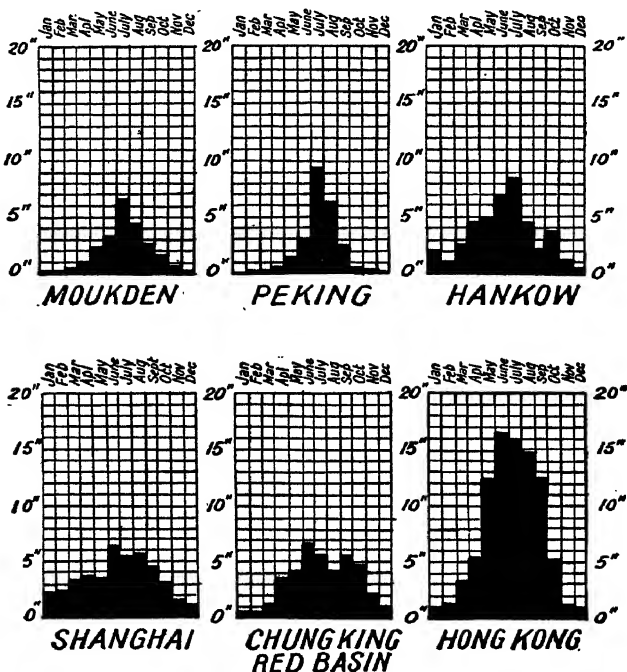


FIG. 259A.—Rainfall graphs of typical Chinese towns.

available forests have long since been destroyed to provide fuel. Straw, cotton stalks, balls of charcoal and clay are all pressed

<sup>1</sup> Zon and Sparhawk, *Forest Resources of the World*, Vol. I (1923); Norman Shaw, *Chinese Forest Trees and Timber Supply* (London, Unwin, 1914); R. Rosenbluth, 'Forests and Timber Trade of the Chinese Empire', *Forestry Quarterly*, Vol. X, 1922, pp. 647-672; H. Handel-Mazzetti, *Naturbilder aus Südwest-China* (Vienna and Leipzig, 1927, with numerous coloured and monochrome plates). Several brief articles on the forests of southern China have appeared in the various new scientific journals published in Nanking and Canton.

service as fuel, for the people have lived so many centuries out forests that they are ignorant of their benefits. Those who do understand and plant trees find them appropriated for by soldiers or even by neighbouring farmers long before they reach any size. Only in the south-east and Manchuria is there timber in quantity. The barren, eroded hills so characteristic of most of China suggest a rocky desert country rather than one which should, properly, be covered with good forest growth. In Shansi, the patches of woodland which remain by hill temple afford but a bare suggestion of the normal vegetation, and the same is true of many other parts of China.

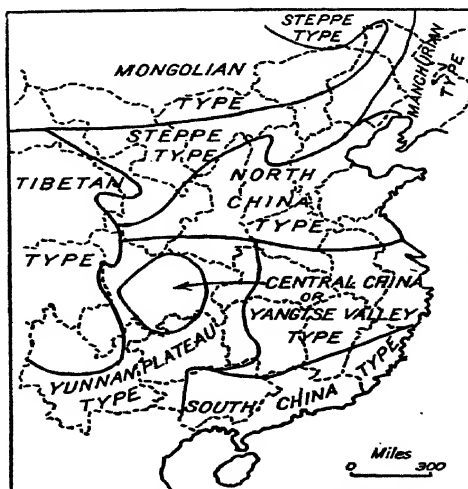


FIG. 259B.—Climatic regions.

The remaining forests of China proper now lie in three main sections:

- a) The Nan Shan or Nanling Mountains, which form an extension of the western plateau of Yunnan and divide the Si Kiang Basin and south-east coast regions from the central basins. The carefully 'cultivated' forests of Fukien and Chekiang in the south-east, with Fukien pine, rosewood and camphor trees and bamboo, offer a remarkable contrast to Central and Northern China.
- b) The Tsinling and Central Mountains, stretching from Northern Szechwan through Shensi into Honan and Hupeh.

(c) The great western plateau of Szechwan and Yunnan.

The natural vegetation of the lowlands of Southern China should be tropical monsoon forest of hardwoods; such forests do occur in the valleys of Southern Yunnan, in the island of Hainan and on the southern slopes of the south-east coastal mountains, and include camphor trees, *Cryptomeria* and *Magnolia*. Elsewhere the normal vegetation of the China type of climate is a mixed forest of conifers, deciduous hardwood trees and evergreen hardwoods. The conifers, such as pine, fir, spruce, larch and hemlock, tend to predominate towards the north and at higher elevations in the south. Hardwoods include oaks, chestnut, ash, elm, maple, with birch, beech, poplar and walnut (the last four especially in more northern regions). There are large forests of birch (*Betula utilis*) in North-western Szechwan. Valuable bamboo covers large areas in Central China, and in the same area specially famous trees include the Tallow-tree (*Stillingia sebifera*), from the fruit of which tallow for candles is obtained; the T'ung or wood-oil tree (*Aleurites cordata*) (the oil obtained from the nuts is poisonous when fresh); and the varnish tree (*Rhus vernicifera*), which is tapped to secure the varnish or lacquer of the Far East. For Manchuria, see below.

**Agricultural Production.** It has already been mentioned that the area and population of China proper are closely comparable with the Indian Empire. Both countries are essentially agricultural and, broadly speaking, self-supporting in the matter of foodstuffs. But China includes a far larger proportion of mountainous country not suitable for cultivation, with the result that the valleys and other fertile regions are usually very densely populated. Indeed, the number of people per square mile in the most densely peopled agricultural regions of China is probably far greater than in any other country of the world. In his delightful book *Farmers of Forty Centuries*, King<sup>1</sup> estimates that in many areas 3,000 people and 1,000 domestic animals find their sustenance on a single square mile of land. In other areas over 4,000 people may even be found. These figures cannot, of course, be compared directly with the densely populated regions of Europe where the population is fed on *imported* foodstuffs. Taking China as a whole, there is rather less than 0.4 acre of cultivated land per head of population.

Messrs. La Fleur and Foscue have recently made an interesting study of agricultural production in China.<sup>2</sup> They point out that, if one takes the *whole* of Chinese territory (China proper, Manchuria, Mongolia and Sinkiang, but excluding Tibet), the

<sup>1</sup> Jonathan Cape, 2nd edition, n.d.

<sup>2</sup> *Economic Geography*, Vol. III, 1927, pp. 297-308.

al area is 2,440 million acres. Half is too arid (1,146 million acres) or too cold (64 million acres); mountains cover a fifth (383 million acres) and infertile soil 36 million acres, leaving 706 million acres, or 29 per cent. of the whole (706 million acres) suitable for cultivation. Out of the latter it is estimated that only about a quarter (176 million acres) is actually cultivated. The authors ask: 'Why should China cultivate only one-fourth of her cultivable land when she is in constant need of food for her teeming millions?' The answer may only be suggested here; and that is, China lacks machinery and its corollary—power, and cannot afford to farm the marginal lands.' <sup>1</sup>

The figures just quoted do not, however, present an ideal statement of the position. They include together really entirely arid countries. Mongolia is an absolutely unknown foreign country to the Chinese peasant in the Yangtze Valley, and the cultivation of the non-cultivated land mentioned above would mean, first of all, a wholesale emigration to a new land.



FIG. 260.—The areas occupied by the principal crops of China.

Taking China proper as the unit, the area including Manchuria is about 1,214 million acres; without Manchuria, 981 million acres. Aridity is not a serious factor except in the north-western loess country, but topography certainly is and the mountainous character of the country probably renders half the whole area of China proper not available. Poverty of soil includes a further percentage. On the whole it is probable that about half the possible area of China proper is cultivated. Of the rest, much is purposely and designedly wasted, cemeteries are possible for a large part. The well-known Chinese veneration for ancestors often results in the best land being given up for ritual purposes. Even in the most densely peopled areas 2 to 3 per cent. of the land is used in this way.

**CROPS.** There are three great food crops, which together occupy nearly three-quarters of the cultivated lands. Rice occupies rather more than a quarter, wheat and millets rather less than a quarter each. The distribution of these three leading crops is shown in Figs. 261, 262, 263.

<sup>1</sup> On the other hand, Paul O. Nyhus, of the United States Department of Agriculture, after extensive study, concludes that the Chinese 'have completely taken up the land capable of yielding a good supply'.

*Rice.* Rice is the dominant, almost the sole, food crop in Southern China and the south-east coast and occupies there nearly three-quarters of the cultivated land. The yield is about 1,750 lb. per acre. In Central China—the Yangtze Basin—rice

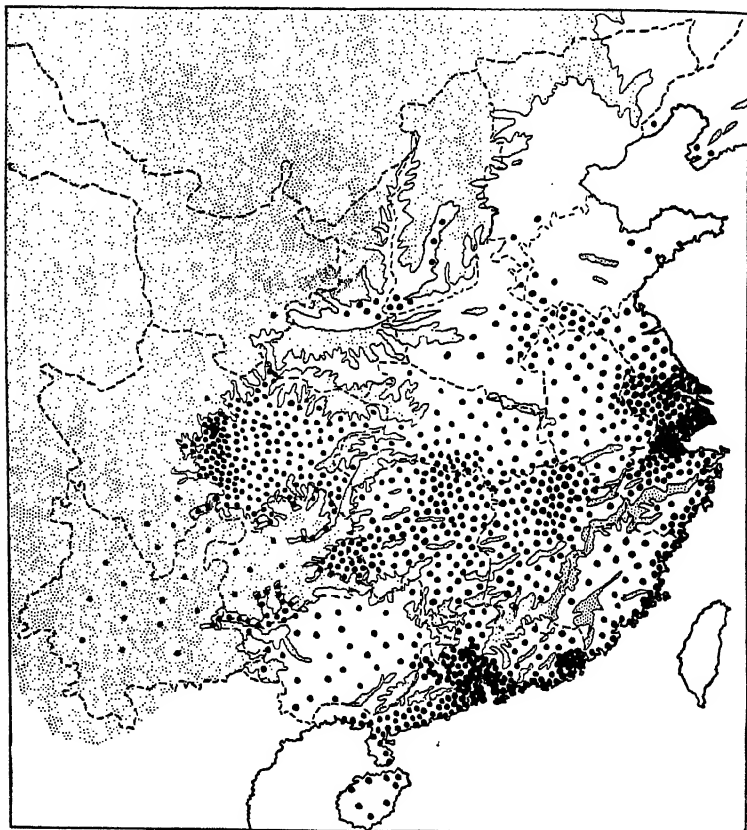


FIG. 261.—The distribution of rice in China.

Each dot represents 50,000 acres, out of an estimated total of 50,000,000 acres. All land over 3,000 feet stippled.

(Based on La Fleur, Fosque and Baker.)

and wheat share the position as leading food grains. In Northern China—north of the 30-inch rainfall line—the proportion of rice is very small. The annual production is probably about 40,000,000 tons.

*Wheat.* Very little wheat is grown in Southern China; in Central China it is important; in North China (especially on

Great Plain and in the Wei Ho Valley) a very important crop, and is also grown over considerable areas in Manchuria. Much could be done to improve acre-yields, whilst the drought-resistant varieties of wheat, such as durum wheat, have a great

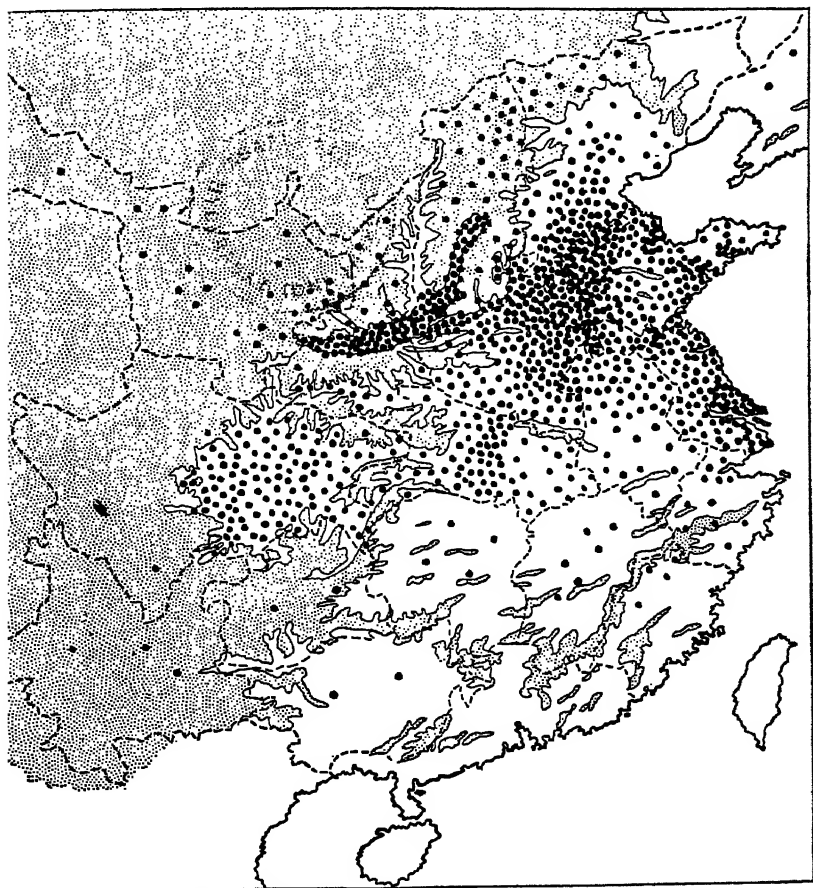


FIG. 262.—The distribution of wheat in China.

dot represents 50,000 acres, out of an estimated total of 37,000,000 acres. All land over 3,000 feet, stippled.  
(Based on La Fleur, Foscue and Baker.)

sible future in the development of the semi-arid tracts on the border of the Mongolian Plateau. The annual production of wheat is probably about 15,000,000 tons.

*Millets.* As in India, the millets become a dominant food crop in where the rainfall is less than 40 inches per year. Their concentration in the north-east and in Manchuria is well seen

in Fig. 263. The better lands in these drier tracts are occupied by wheat and much land formerly given over to millet is now used for soya-beans. In this map of millets has been included kaoliang, the favourite grain sorghum of the north. It grows

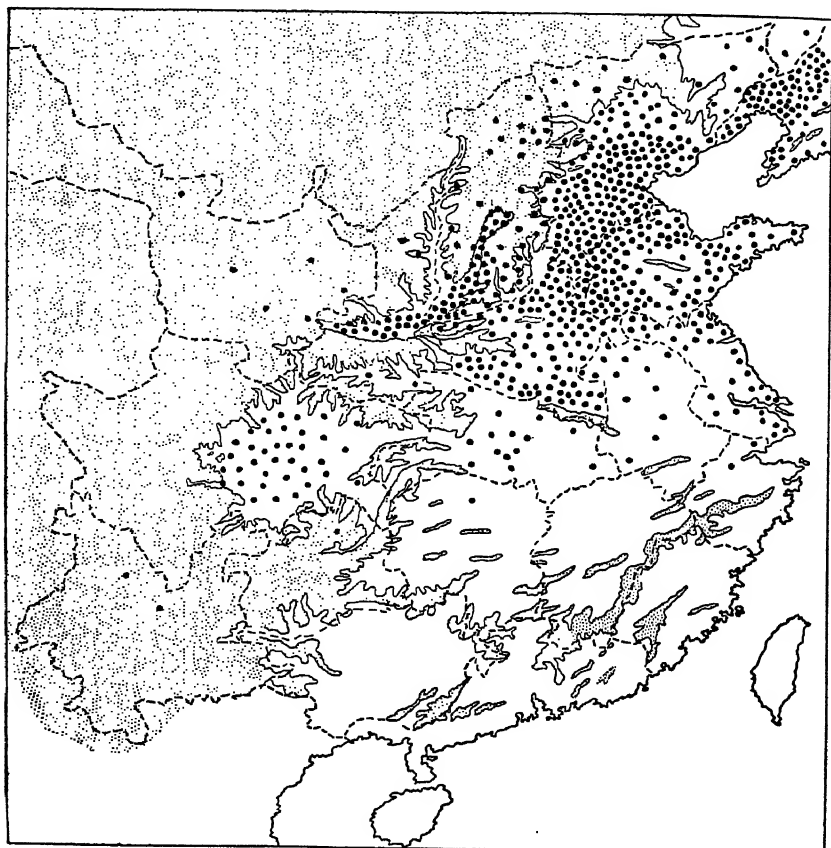


FIG. 263.—The distribution of millet in China.

Each dot represents 50,000 acres, out of an estimated total of 35,000,000 acres. All land over 3,000 feet, stippled.  
(Based on La Fleur, Fosue and Baker.)

to the height of 8 or 10 feet and the brownish coloured grain is of the size of a small pea.

*Soya-beans* or *Soy-beans*. Although long known in China, it is only of recent years that the proper preparation of the bean, to avoid the rancid taste, has become known. It is rich in oil and extremely nutritious. The acreage devoted to this



particularly in Northern China and Manchuria, has increased in recent years.

*Cotton.* Most of the cotton of China is grown in the central and northern provinces, but the crop is not of first-class importance. There has been considerable argument concerning the yield per acre of the major crops of China. On incomplete statistics it is concluded that the yield was 20 per cent. below United States standards and that the adoption of modern methods would go far to alleviate conditions due to food shortage. Later investigations, however, show that the yield per acre is above world average and considerably above the United States average for practically every crop. The success of the Chinese amateur gardener in many parts of the world, in areas which have the despair of others, renders this very probably correct. The yield of rice is *twice* the world's average.

*Other Crops.* Even after allowing for soy-beans, Fig. 260 shows a quarter of the land is occupied by 'other crops'. These vary according to the location. In the north, barley is significant; in wetter regions, corn. Tea, so indissolubly connected with China, has been of steadily decreasing importance as far as export trade is concerned, but occupies large areas in the Yangtze basin and the hills of the south-east. Every farm has a patch of vegetables—sweet potatoes are widely grown, but especially in the south-east; potatoes, onions, cabbage and various beans are grown almost everywhere. Most peasants have a small patch and a few tobacco plants. In the drier, poorer regions, pea-nuts or ground-nuts flourish. In the warm south are many fruit orchards—with oranges (a native of China), and especially mandarins and lichee, also ginger, bananas and sugar cane. In the silk regions of the Yangtze the necessary mulberry trees are kept trimmed as bushes.

It is a common error to consider the Chinese as rice-eaters. In the north, millions have never tasted rice; to tens of millions it is a luxury only eaten once or twice a year. The Chinese diet, known in the restaurants of America or Europe, is unknown in China except that it bears some relation to the diet of the Cantonese—who have supplied most of the emigrant Chinese.

**AGRICULTURAL REGIONS.** It will be obvious from what has already been said that four agricultural regions can be distinguished, corresponding to the four climatic provinces:

In South China rice is the staple crop.

In Central China wheat and rice are the two main crops.

In North China millets and wheat are the staple crops, with soy-beans also important.

In Manchuria millets and soya-beans form the leading crops, with some wheat.

**ANIMALS.** On the whole, the domestic animals of China are widely distributed through these regions, and their distribution is determined by various factors. China has little pasture and no hay—there is no animal husbandry as such. The 9,000,000 horses and mules in China and Manchuria are mainly in the drier north, where they can be used as pack animals, being unsuitable in the wet rice lands of the south. As in India, cattle in China are primarily draught animals. The Chinese eat very little beef and make but little use of milk or other dairy produce. There are about 20,000,000 oxen and water-buffaloes in China, especially in Central China and South China (notably the Si Kiang Basin), where they are essential for ploughing the rice-fields. In many areas there are great possibilities in the establishment of a dairying industry. Of all the non-vegetable foodstuffs of the Chinese, fat pork is easily the most important, and there are probably about 60,000,000 swine distributed through China. Broadly, the density of the pig population varies directly with the density of the human population. Sheep in China are most numerous in the semi-arid north and west, where they are raised primarily for the sake of their coarse, inferior wool. They graze over wide tracts of country under the care of shepherds. Little if any use is made of the meat apart from local consumption. In China nearly every peasant farmer owns at least half a dozen fowls. Again, as in India, the traveller can usually rely upon getting a tough chicken for his dinner and a diminutive egg for his breakfast. There is a large export of eggs and egg products (albumen) from China.

**AGRICULTURAL METHODS.** The overcrowding in the agricultural lands of China, which has existed for thousands of years, has resulted in highly specialized forms of intensive agriculture. In the United States there are about 3·5 acres of cultivated land per head of population; in China the average is less than 0·4 acre, and over considerable tracts is probably less than 0·2 acre. The two great achievements of the Chinese farmers have been the maintenance of soil fertility and the highly specialized system of intensive cultivation. The secret of the first achievement, accomplished entirely without the aid of chemical fertilizers, is in the use of the wastes of the human body and the wastes of fuel. Some idea of the value placed by the Chinese on human excreta, both liquid and solid,—regarded very often merely as waste products in 'civilized' countries—may be gauged by the fact that as long ago as 1908 a Chinese contractor paid £6,500 a year for the privilege of removing the

st-soil from the International Concession area of Shanghai. Manure cannot be applied direct to the soil, but needs careful preparation requiring several months. The preparation, including mixing with river mud or soil, is carried out in a 'compost pit'. In the flat lands, especially of Central and Eastern China, the widely practised irrigation has constantly enriched the fields with fertile silt deposited from the flooders. In the north, the innumerable floods, disastrous though they may be to life and crops, in the long run have proved of incalculable benefit in this way. In hilly land, the prevention of soil erosion has been brought to a fine art. The hills are not only carefully terraced to prevent the washing away of the soil, but the terraces are so arranged as to arrest the run-off until suspended matter shall have been deposited. The terracing required a huge expenditure of human labour, but then there is nearly always a surplus of able-bodied labour even in the most intensely cultivated area. Even more laborious is the manual carrying of soil from one area to another, usually by means of baskets. A barren field may actually be given an artificial layer of soil.

The second achievement may be summed up by saying that a Chinese farm is really a large garden. The careful working up of the soil, the mixing of manure and soil and then applying it as a dressing makes multiple cropping possible. In India double cropping, where one crop, such as wheat, is grown as a winter crop and another in the summer, is common. But in China as many as three crops are sometimes grown simultaneously on one field, all at different stages of maturity, the first nearing the harvest when another is appearing. The practice of starting rice in 'nurseries' and then transplanting the little rice plants by hand is carried on in China as in India, but has in China a special significance. If a nursery of one acre can supply rice seedlings for ten acres, then the nine acres can, until the rice is ready for transplanting, be used for another crop. Although the bullock-drawn primitive wooden plough seems absurd to Western eyes,<sup>1</sup> it is essential to Chinese agriculture and could not be replaced by the European or American implement. It only tickles the surface of the soil, but thereby prevents the rapid soil erosion to which the deep European furrow immediately conduces. It makes a powdery surface layer and thereby preserves moisture as in the 'Dry farming' methods of Australia.

In the more densely peopled areas hand-digging is the usual method of preparing the land. Chinese farming has been well described as efficient when measured in yield per acre; terribly wasteful if measured in human cost.

and America. Further, the ox is invaluable for his manure. The fields on a Chinese small holding are often divided into parallel ridges and furrows, not only for the purpose of controlling more effectively irrigation water and soil erosion, but to permit the growth of rice in the hollows and such crops as peas, vegetables, ginger, etc., on the ridges. Even the permanent bunds between the larger fields are made useful by the planting of mulberries or pear-trees on them.

It is impossible here to enlarge further on the fascinating subject of Chinese agriculture, but the reader is referred to the most interesting details given by Dr. King in his *Farmers of Forty Centuries*.

**Fishing.** Fish is an article of diet widely used in China. The rich man's table would scarcely be complete without such delicacies as shark's fins and edible seaweeds, obtained by the intrepid fishermen of the south-east coast, whilst rivers and lakes throughout the country yield their quota for the masses.

**Manufactures.** China probably produces more silk than the whole of the rest of the world. Sericulture is especially important in Central China and Shantung and foremost among home industries is the reeling of silk. Of recent years there has been, however, a marked increase in steam filature silk as opposed to hand reeled.

Native cotton and silk looms are found in most Chinese villages, but an important feature in the development of modern China is the erection of cotton, wool and silk mills in Canton, Shanghai and other great centres.

In January, 1933, there were 128 cotton mills in China with 4,500,000 spindles and 43,000 looms. Forty-one were Japanese-owned (40 per cent. of the spindles and 45 per cent. of the looms); 84 Chinese-owned and 2 large British-owned mills (6 per cent. of the looms). The production of cotton piece-goods exceeds  $2\frac{1}{4}$  million tons, and China not only supplies the home market but exports large quantities. This is an important development which must not be overlooked.

Modern flour-mills are becoming important at Shanghai, Tsingtao, Wusih and Hankow. Amongst other industries mention must be made of the great Chinese ironworks at Hanyang, near Hankow, using the Tayeh iron ores.

**The Distribution of Population.** The difficulty of estimating the population of China is well known, and a complete Census, as understood in other parts of the world, has never yet been taken. Curiously enough, one form of the Census is a very old institution in China, the estimates being made on the basis of tax-paying households. It may be generally presumed

all early estimates based on the returns of tax-collectors well below the real population, since the tax-collector would have to account for taxes paid by the number of households shown on his returns and would himself grow wealthy on the taxes paid by 'unrecorded' households. A Board of Revenue established in 1885 gave a population of 377,636,000 for China proper, including Manchuria. In 1910, the year before the fall of the empire, the 'Minchengpu Census', based on the number of families, and in which an arbitrary multiple of 5.5 was employed to establish the number of individuals, gave a total of 331,188,000 for China and Manchuria. In 1918-19 the China Continuation Committee compiled a large survey volume entitled *The Christian Occupation of China*. The work included a careful estimate of population, based on official information, and carefully checked by competent missionaries with a knowledge of local conditions.<sup>1</sup> At the same time the Chinese Post Office, an efficient modern organization, was preparing an independent estimate. The results of the two estimates were as follows:

	<i>Government Gazette, 1911.</i>	C.C.C. 1918-19.	Post Office, 1925.
China Proper . . . .	302,113,000	420,926,847	458,779,714
Manchuria . . . . .	12,740,000	19,998,989	24,040,819
Mongolia . . . . .	1,800,000	7,780,000	—
Tibet . . . . .	2,000,000	1,750,000	2,688,305
Yunnan . . . . .	2,000,000	2,200,000	—
Total . . . . .	318,653,000	452,655,836	485,508,838

Possibly the numbers are slightly overestimated rather than underestimated, and the population of China proper including Manchuria is probably in the neighbourhood of 450,000,000. This gives an average density of 238. The mountainous nature of the surface of China and the resulting concentration of the population in the fertile valleys and plains renders this figure of very little significance. Thus the density of population in Kiangsu, mainly agricultural land, is between 870 and 880, whilst over considerable areas, as already noted, the density may reach 3,000 or 4,000 per square mile even in purely agricultural country.

<sup>1</sup> See summary of certain aspects in P. M. Roxby, 'The Distribution of Population in China', *Geog. Review*, Vol. XV, 1925, pp. 1-24.

Two factors in the main determine the present distribution of population in China. The first is physical. Of necessity the population is concentrated in the non-mountainous areas where intensive agriculture is possible. This may be demonstrated in

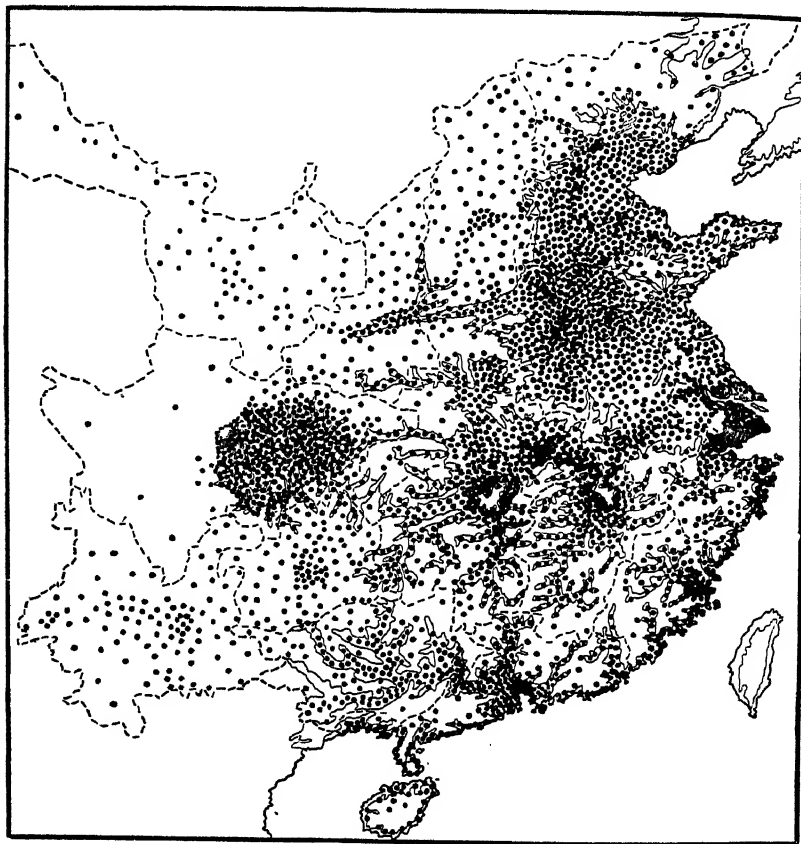


FIG. 264.—The population of China.

Each dot represents 100,000 people, based on the estimates of the 1923 P.O. Census. The fine line is the 1,500 ft. contour.

a broad way by superimposing a physical map (on which the 2,000-foot contour is shown) on a population map. The other factor is religious. Ancestor-worship is the universal religion of the country and the first thought of the peasant is: 'Who will tend the graves of my ancestors if I migrate to new lands?' Despite the attractions of cheap, fertile land crying out for

vation in Manchuria and the fringes of Mongolia, the Chinese peasant elects to starve in his ancestral home, retaining the divided family and within sight of the graves of his forefathers.

Not that the attractions of the new lands are not known, every year there is a temporary migration thither of thousands upon thousands of workers. The Chinese peasant lives in direct opposition to economic factors and often pays for his situation by death from starvation. Perhaps mobility—rail—  
—is the only solution.

Various attempts have been made to analyse the effects of overcrowding on the fertile lands of China.<sup>1</sup> Concerning the cost of living, which is rather less in the north than in the south, Professor C. G. Dittmer estimated that a family of five could live in comparative comfort on a total income of £10 a year (Chinese currency), or roughly £10, and that families earning half this amount could live within their incomes. Professor Dittmer's calculations (published in 1918) were made some years ago and the cost of living—and wages—in pre-war years to 1925 rose 100 to 200 per cent. The following estimates were made by Dr. Ta Chen more recently (1925):

	Cheufu (near Peking).	Huichow (Anhui, Central China).
Food . . . . .	\$84.00	\$106.60
Shelter . . . . .	40.00	40.00
Transport . . . . .	6.00	5.50
Miscellaneous (fuel, light, etc.) . . . .	5.00	5.00
Total expenses . . . . .	135.00	157.10
Average income of family . . . . .	93.12	88.80
Deficit . . . . .	\$41.88	\$68.30

It will be seen that the average income of a family is far below that required to maintain an adequate standard of living even to the modest Chinese level. The normal result is that the average Chinese peasant family is unable to obtain sufficient food to preserve health. A bountiful harvest does not result in a surplus, it merely means that for at least one year the peasants on the country-side are properly nourished. A failure of the harvest means inevitable famine and starvation—even with the modern development of transport and the work of well-organized relief.

See the interesting account in W. H. Mallory, 'China, Land of the Future', *Amer. Geog. Soc.*, 1926.

relief committees—one must still say starvation or at least semi-starvation. There is no margin. It may be stated here that the normal diet of the Chinese peasant consists of millet and wheat (in the north) or rice (in the south), vegetables, oil and tea, with fish and meat as luxuries rather than necessities. In times of famine, flour made of ground leaves, husk of the ground-nut, bean-husks, sawdust and fuller's earth all have to be used as food, and the boiling water knows no tea leaves.

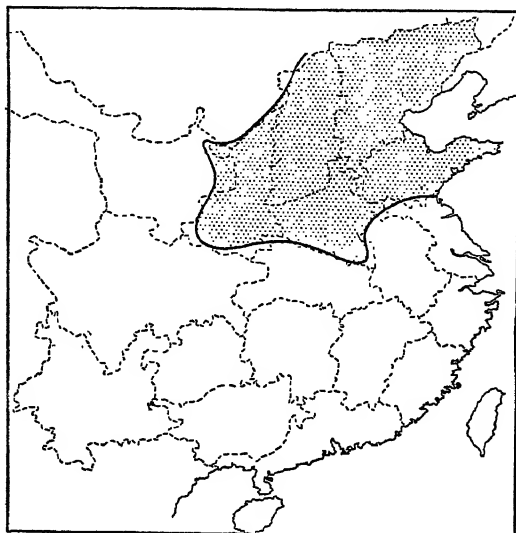


FIG. 265.—The famine region of China.

It seems almost impossible to suggest an adequate remedy for the over-population which is pre-eminently the problem of the north, where the lower rainfall renders the consequence of drought more serious than in the Yangtze Basin. The obvious solution—to Western minds—lies in the open spaces of Manchuria and the fringes of Mongolia. There is already a steady overflow from the northern plains to these areas, but only in small part a true colonizing movement, largely a temporary migration. The ultimate cause of over-population is the social philosophy of the Chinese people. Ancestor-worship, the unity of the family and the duty of continuing the family, combine to make a real migration almost impossible. Everywhere the roots of the family are firmly anchored in the native soil by the graves of its forbears. Most of the Chinese who now populate in large



are the Far Eastern tropics—Malaya, Indo-China, the East Indies and the Philippines—are Cantonese, who have to some extent emancipated themselves from traditional ideas. But the Cantonese abroad retain a close connection with their land and often return in their old age with the wealth accumulated abroad.

In Northern China, where the problem is most acute, river-control for the prevention of floods, scientific irrigation, afforestation and industrialization would do much to relieve the congestion and to raise the standard of living, but these improvements depend upon the establishment of a strong and stable government in the first place and at the best would be but a temporary remedy. The ultimate hope for the progress of New China lies in education, the emancipation from a traditional conservatism which is stifling progress.

Reference has already been made to China as a land of famine. Mr. Mallóry, in his survey of famine conditions in China, mentions the astounding fact that between the years B.C. and A.D. 1911 there are definite records of 1,828 famines occurring nearly every year in some one of the provinces. Untold numbers have died of starvation through the ages. Even as recently as 1920-21 the great drought in North China claimed 10 million victims and rendered 20 million destitute. Mr. Mallóry divides the causes of famine into economic, natural, political and social. With the economic we have already dealt with; as to natural causes it is sufficient to mention droughts due to the irregularity of the rainfall; floods due to the character of the rivers of Northern China, locusts, typhoons and earthquakes. The last-mentioned are unimportant, save in the loess districts, where a shock may cause the fall of enormous masses of loess, burying dwellings and destroying fields. It is necessary to stress the obvious effects of the present political situation of China. Of the social causes of famine, the high death-rate, which, despite the high death-rate among infants and mothers, results in a large natural increase, the waste of money on ceremonies, the waste of land for grave mounds, and the family system which prevents co-operation may be specially mentioned.

Although in dealing with physiography, climate and agriculture we have stressed the division into three regions, coincident with the three great river basins, it is necessary to emphasize the remarkable contrast between the north and the south. The map, Fig. 265, suggests the line or rather the zone of division—roughly midway between the Hwang Ho and the Yangtze Kiang. Dr. Cressey has so well summarized the con-

trasts that it is difficult to improve upon his tabular statement (slightly altered) :

#### THE NORTH

Limited, uncertain rainfall.  
Disastrous floods and droughts.  
Climate influenced by Mongolia :  
cold winters, hot summers, dust  
storms, a little snow.  
Four to six months growing season,  
one or two crops, agriculture pre-  
carious if rainfall is deficient.  
Frequent famines.

Unleached, calcareous soils ; dry  
terrace cultivation.  
Grassless and treeless ; brown and  
dusty in winter.  
Kaoliang, millet, wheat, beans.  
Roads and two-wheeled carts, draft  
animals (donkeys and mules).

Short, sturdy people of uniform race,  
conservative, speaking mandarin.

Seventy-five per cent. rural living  
in small villages of mud-walled  
houses with heated brick beds or  
kangs.

Cities with wide streets.

Foreign intercourse by land, emigra-  
tion to Manchuria, little use of sea,  
poor harbours on coast, few fisher-  
men.

#### THE SOUTH

Good or abundant rainfall.  
Water always available.  
Climate influenced by the ocean :  
cool winters, hot moist summers,  
typhoons, snow rare.

Seven to twelve months growing  
season, two or more crops, inten-  
sive agriculture, crop failure rare.  
Relative prosperity, except for over-  
crowding.

Leached, non-calcareous soils ; irri-  
gated terraces.

Bamboo and abundant vegetation ;  
green at all seasons.

Rice.

Flagstone trails and sedan-chairs,  
coolie carriers (water-buffaloes in  
the fields).

Taller, less sturdy people, mixed  
with various primitive non-Chin-  
ese aboriginals, speaking various  
dialects, radical and restless.

Seventy-five per cent. rural living  
in huts with woven bamboo walls  
and thatched roofs.

Teeming crowded cities with narrow  
streets.

Foreign intercourse by sea, emigra-  
tion overseas, bold sailors and  
fishermen, good harbours on coast.

**Brief Outline of the History of China.**<sup>1</sup> The origin of the Chinese people is still a matter of discussion and controversy ; but it is widely recognized that the Chinese civilization is one of the oldest in the world. Possibly the present inhabitants of China find their origin in what is believed to be the cradle of civilization—the land of Sumer.

History, however, may be said to begin with Yao the Great in 2357 B.C., who was the first authentic ruler in China. The history of China falls roughly into the following divisions : (I) The Feudal Period, 2357 B.C.—221 B.C. (II) The Monarchial Period, 221 B.C.—A.D. 1912. (III) The Republican Period, from 1912 onwards. In the beginning the organization was akin to that of feudal chieftainships and the limits of territory never

<sup>1</sup> This section was written by Miss D. M. Fisher, B.A.

exceeded the bounds of the modern provinces of Shansi, part of Hensi, the southern part of Chihli and a strip only of Shantung. But by the second century B.C. the Chinese were masters of lands extending to the Yellow Sea on the east, the Yangtze River on the south and the Kialing River on the west. In 23 B.C. the most powerful State conquered its greatest rival and two years later the Empire of China was united under a single ruler. So we come to the second great stage in Chinese history.

The first Emperor, Ch'in Shih Huang Ti, ordered all records of the past to be destroyed, and had it not been for the disobedience of several hundreds of students no trace might have been left of earlier history. In order to check the incursions of Tartars and other northern tribes, this Emperor united the various existing walls into one Great Wall, which, according to one estimate, attained a length of 1,145 miles. Gradually Shantung, Kiangsu, Anhwei, Honan, Hupeh and Hensi were added to the Empire.

The Han Dynasty, which ruled from 206 B.C. to A.D. 221, is one of the most famous in Chinese history. The Han era was a time of great prosperity. Literature, art and military studies were among the branches of learning that flourished. During the rule of the Han Emperors the Huns became a serious menace and 250 years were spent in wars with the invaders. The Emperor Wu Ti (B.C. 140-86) was an able soldier who succeeded in adding Northern Korea and Kansu to his dominions, while Chinese Turkistan became a tributary province. By the time of Hsian Ti (73-48 B.C.) the whole of Central Asia sent tribute to the Emperor, the Huns were driven far westwards and Chinese influence spread even to the Caspian Sea. There followed a period of decline until the dynasty came to an end, only to be followed by other minor Dynasties (A.D. 221-589). The Empire was divided into three kingdoms—Shu in the west, Wu in the centre and south, and Wei in the north. In 589 the Empire was again united and peace was restored under the Sui emperors. From 618 to 907 the Tang Dynasty was in power and contended with enemies in Tibet, Korea, and Japan. It is, however, an age associated with the art of poetry. The Tangs weakened their influence by making the chief governorships of the Empire hereditary. Another age of disintegration followed until the Sung Dynasty brought about reunion in 960. Literature and, still more, philosophy, characterized the Sung period. The Northern Sung emperors (960-1127) succeeded in finally subjecting the whole of the South, and the Southern Sung (1127-1280) were engaged in wars with the Kins. The

most deadly of the Empire's foes waited their chance of striking a blow. In 1211 began the great Mongol conquest under Ghenghis Khan, who had helped the Chinese against the Kins, but who now rapidly overran Chihli, Shensi, Shansi and then Honan. His successor, Kublai, invaded the south, conquered Yunnan and annexed Burma. In 1280 the Mongols had wrested the rule of the Empire from the Chinese and were not to be overthrown until 1368. It was the Mongol, Kublai Khan, who received Marco Polo and about whose court we are thus able to gather some interesting information. The year 1356 saw the beginning of the downfall of the Mongols, when the leader of the Chinese rebellion, Chu, captured Nanking. Central China was soon reconquered and in 1368 the Chinese found themselves once again their own rulers.

The Ming Dynasty sat on the imperial throne from 1368 to 1644. The new House in 1421 transferred the capital of the Empire from Ying Tien (Nanking) to Pei P'ing (Peking). During the fifteenth century the Mongols made another bid for power by invading China with some measure of success. The sixteenth century is worthy of note in that it witnessed the real beginnings of relationship between China and European nations. The Portuguese reached Canton and in 1550 or thereabouts were allowed to settle in Macao. The Spaniards, English and Dutch soon followed in the track of the Portuguese merchants in a bid for Chinese trade. Meanwhile the Chinese were yet again occupied with Mongol incursions on the north. Along the coast the Japanese continued their hostile raids and captured many towns. Towards the end of the century the powerful Ming Dynasty began to decline. Foreign elements were creeping in: the Dutch had settled in Formosa, the English had penetrated to Canton and Jesuit missionaries of different nationalities were rapidly gaining ground. With so much to occupy them the Ming emperors ultimately fell victims to Manchu tribes who invaded the Liaotung Peninsula in 1618 from the north-east and set up a capital of their own at Moukden. Subsequently Peking was captured and the Manchus were the rulers of China from 1644 until 1912. This history of these years is very largely concerned with further attempts on the part of the English, Dutch and Russians to secure closer relations with China, principally for trade purposes. Embassies from Russia, Holland and Britain met with very little success owing to the many formalities expected of them when approaching the person of the Emperor. In the eighteenth century the Emperor Ch'ien Lung exacted tribute from Burma and warred with the Gurkhas of Nepal in 1790. In 1793 he gave the British permission to

trade at Canton. The ill-fated embassy of Lord Amherst in 1816 met with refusal because of the failure of the ambassadors to 'kow tow'. The first war, the 'Opium War', with Great Britain took place in 1840-43 and resulted in the Treaty of Nanking by which Canton, Amoy, Foochow, Ningpo and Shanghai were opened to foreign trade and Hong Kong was ceded to Britain. The disastrous Taiping rebellion (1850-64) began as a religious movement owing to the persecution of Christianity by the Manchus, but it soon became a political rebellion when Hung, the leader, aimed at the overthrow of the Manchus. The rebellion involved twelve provinces and ruined hundreds of cities. In 1856 the second war with Britain was waged and France also took sides against China. In 1860 the Convention of Peking imposed an indemnity on the Chinese and opened Tientsin to foreign trade. Thenceforward it was the West who dictated the terms. In 1875 Ichang, Wuhu and other towns were opened. In 1895 Korea obtained independence, Formosa was ceded to Japan and still more ports admitted foreign ships.

Tsingtao, in Kiaochow Bay, was secured by Germany in 1898, to be captured in 1914 by Japan and in 1922 returned to China. In 1898 also, Great Britain obtained Wei-hai-wei in Shantung and a lease of territory on the mainland opposite the island of Hong Kong. Russia was to hold Port Arthur and Talienwan (or Dairen) on lease. Following the Russo-Japanese War the Liaotung Peninsula and the control of the railway from Port Arthur to Ch'ang-chun were transferred from Russia to Japan. The French in 1898 were granted a ninety-nine years' lease of the Bay of Kwangchow-wan between Hong Kong and the island of Hainan.

The 'Boxer' outbreak in 1900 was a reaction against foreigners, whom it aimed at expelling. It led only to a recognition by the Chinese of the necessity for reform in all commercial administration. The Manchu despotism was nearing its fall. Sun Yat Sen and Yuan Shih-k'ai were leaders of the revolution. They demanded the abdication of the Manchus: the dynasty brought its long reign to an end in February, 1912. A republic with Yuan Shih-k'ai as President was established. Yuan died in 1916 and a state of disunion once more set in. Great military war-lords quarrelled over a revision of the constitution and a period of civil war and outlawry ensued. The National Government removed the capital from Peking (renamed Peiping—a former designation) to Nanking in 1928 and is gradually establishing itself. Britain restored Wei-hai-wei in 1930 and Belgium their concession at Tientsin in 1931. Under the

control of Japan a nominally independent state of 'Manchukuo' has been created in Manchuria and its boundaries extended to the Great Wall.

**Communications.** It is the physiography of China which is mainly responsible for the development of certain special types of land transport in China. The familiar bullock-cart or buffalo-cart of India is of restricted use and distribution in China, being found mainly in the north. In the south either physiography prevents the construction of roads for wheeled traffic—as it does in the Red Basin—or land is too precious for it to be wasted on the construction of a roadway. Or again, why render the problems of 'unemployment' more acute by utilizing an animal where a man could do the work? As a result of these conditions there are three special types of transport still widely used in inner China. One is the wheelbarrow, on which goods can be loaded or passengers carried and full use be made of the narrow pathways. The fare demanded by the owner-driver-steed and conductor is but small and the wheelbarrow buses are very popular, especially in the Yangtze Basin. Only the rich ride in a palanquin or sedan-chair supported by two long bamboo poles which rest on the shoulders of the two carriers. Even more characteristic of China is the carrying pole with goods suspended from either end. The chair and the carrying pole may be used in those parts where mountain paths make the wheelbarrow useless. Where watercourses are available junk traffic becomes important. The Yangtze and Si Kiang, and to a less extent the Hwang Ho, are of the greatest importance, and the Chinese do not always get the credit they deserve for seamanship, though it is amazing the voyages which the natives of the south-east coast will attempt on the stormy China seas in their little junks. The Yangtze and its tributaries form the great highway of communication in Central China; the Grand Canal and the network of small canals serve the same purpose in the Yangtze Delta and northwards to the Great Plain. Quite a considerable proportion of the population live on their boats. The city of Canton, for example, embraces an extensive floating town of junks, each tenanted by a Chinese family and its picturesque but unfriendly Chow dog.

Turning to the development of modern communication in China, the provision of roads and railways is one of the greatest needs of the moment. Ocean vessels can reach Hankow; steam launches ply on the Yangtze to Ichang and even into Szechwan, on the Si Kiang and to a more limited extent on other waterways. When this book was first published, in 1929, it was not too

nuch to say that roads fit for motor traffic were absolutely non-existent over enormous areas. But progress is being made. In the province of Kwangsi—a remote and supposedly backward area—2,000 miles of motor roads were constructed in the few years ending 1930. In 1933 it was said that 2,000,000 miles of road were under construction and motor-buses now ply for hire in every province of China.

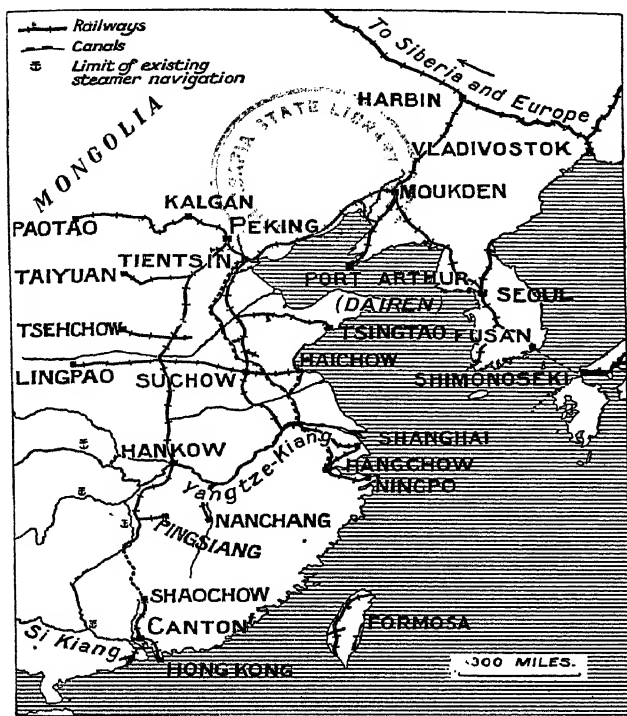


FIG. 266.—The communications of China.

By the end of 1930 there were 12,000 miles of railway in China, rather more than half the total in Britain. This may be compared with about 45,000 miles of road passable for automobiles (1933) and on which there were 45,000 cars. The railway system does not yet link Central and Southern China and the chief lines are the Peiping-Hankow and the Peiping-Tientsin-Suchow-Shanghai. A branch from the Han-

kow line was carried to Sian in the Wei Ho valley in 1934, and it is possible that this line may eventually be carried westwards to link with the Russian system and so with Europe. The long-projected connection between Canton and Hankow still remains uncompleted. An account of Manchurian railways is given under Manchuria. Yunnan is linked with Hanoi in French Indo-China by railway, but some idea of the difficulties of construction may be judged from the statement that in the 289 miles of this line in Chinese territory there are 152 tunnels and 3,422 bridges.

There are regular aerial services over at least 1,500 miles of route in China. Shanghai and Ichang, Shanghai, Nanking and Peiping are amongst the places linked by these services.

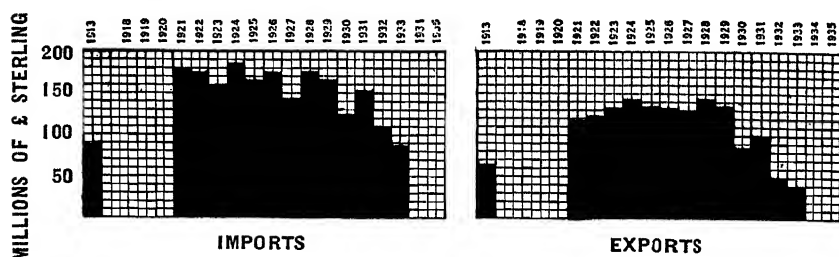


FIG. 267.—Graphs showing the fluctuations in recent years of the trade of China converted into sterling.

No account of communications in China, however brief, would be complete without reference to the 'Treaty ports'. For long Canton was the only gateway into China open to foreigners; it was not until after the Treaty of Nanking that Amoy, Foochow, Ningpo and Shanghai, in addition to Canton, were definitely opened to foreign trade. The opening of other ports followed, so that 107 are now free to foreign trade. It should be noted that these include numbers of inland towns.<sup>1</sup> Two instances alone will be sufficient to show the paramount importance to China of the Treaty ports and railways. It is emphasized by Smith<sup>2</sup> that all modern iron and coal workings in China owe their inception and development to modern communications, so that, conversely, the development of China's resources is impossible without railways. Professor W. J.

<sup>1</sup> E. T. Williams, 'The Open Ports of China', *Geog. Review*, Vol. IX, 1920.

<sup>2</sup> *A Geographical Study of Coal and Iron in China*. See p. 471, footnote.



Hinton, of Hong Kong, has shown very clearly that China of to-day falls into three main economic zones :

(1) The zone of the great Treaty ports and their immediate hinterlands.

(2) The zone along the railways and great rivers.

(3) The great interior—unreached at present by railways.

It has been said very rightly that China at present has four great needs—stable government, railways, uniform weights, measures and coinage, and the abolition of the *likin*. The *likin* is a system of local taxation or local Custom dues which are levied indiscriminately on goods in transit by any local authority or even local potentate who may be in need of funds.<sup>1</sup>

**Foreign Trade.** China's foreign trade has undergone, and is still undergoing at the present day very rapidly, a remarkable process of evolution. Two thousand years ago China was exporting silk to the wondering nations of Europe and over the old 'silk road' of Central Asia passed caravans with porcelain, jade, lacquer and other artistic products. As early as A.D. 300 the Arabs had a trading post in Canton—for many centuries the only entry by sea into the country. From those early days right until the latter part of the nineteenth century foreign trade was mainly of exports: every year since 1877, on the other hand, the value of imports has exceeded that of exports. Until that date Europe wanted the tea and silk of China, but the old Chinese civilization was so self-contained that there were no acceptable imports. China wanted silver, but quantities of the precious metal for shipment to China represented a drain on the resources of Europe and America. Furs were acceptable. Some ships sold ice in South China! Foreign traders encouraged a demand for opium to obviate their difficulties, but international complications followed.

Taking the export trade prior to 1914, tea (54 per cent. in 1871) and silk (42 per cent. in 1899) led during the nineteenth century when beans and bean oil from Manchuria became important. In the post-war era raw materials—beans, raw silk, cotton, wool, hides and skins, coal, metals and ores—have formed one-half of the total exports; foodstuffs, largely eggs and egg products, nearly one-third; manufactures, one-sixth—a proportion rapidly increasing owing to the increase of cotton cloth.

In 1913 one-third of all the imports were cotton goods

<sup>1</sup> The abolition of *likin* was announced in January, 1931. A standard dollar was introduced in 1933 and became the official currency. It is to be minted in Shanghai.

(against 0.3 per cent. exports); by 1932 this proportion had dropped to 8 or less than the exports. But China's contempt for foreign manufactures has passed; imports of iron, steel, machinery, automobiles (and the petroleum products with which to run them), dyestuffs, paper, chemicals and a host of others bear witness to this. The imports of foodstuffs—sugar, rice,

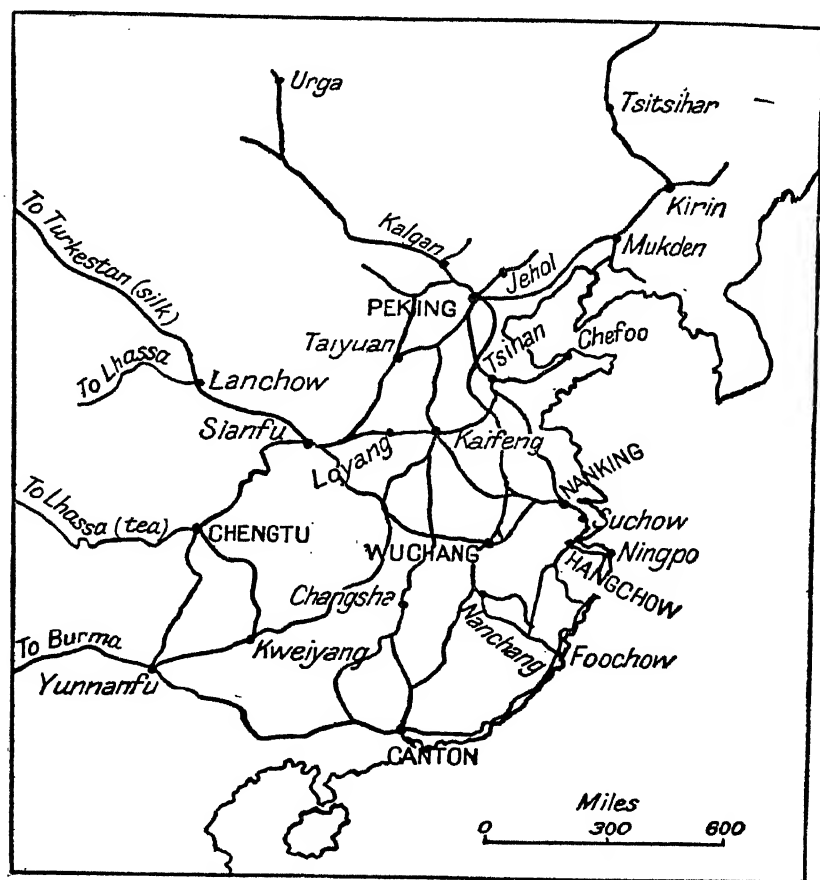


FIG. 267A.—Ancient highways.

fish, flour—is indicative of the pressure on the land of this agricultural country.

The detailed study of China's foreign trade has been difficult owing particularly to the fluctuation in the value of silver—the basis of Chinese currency—and the use of a hypothetical silver unit until 1933 (the Haikwan tael) as the 'money of



cultivators. Yet Shanghai is only indicative of what is happening to the larger Chinese cities—with their modern buildings, electric light, water supply and crowds of cars.

If one includes Manchuria, the second port of China is Dairen, followed by *Tientsin*, the outlet of the North China Plain, and *Canton*, the outlet of the south. Tientsin is hampered by a winding silt-laden river and loses much of its trade to Tsingtao (with one of the best harbours in North China) and Chefoo; Canton, with inadequate harbour facilities, loses much trade to Kowloon and Hong Kong. Hankow is the great river port of the Yangtze, accessible to 10,000-ton liners; Swatow and Amoy are the main ports of the south-east coast. The ports enumerated account for 90 per cent. of the trade.

It should be noted that nearly all the foreign trade of China is sea-borne (cf. India); the overland export of 'bricks' of tea dust to Russia is far less important than formerly.

#### REFERENCES

Since the first edition of this book was published there has appeared an excellent geography of the country: G. B. Cressey's *China's Geographic Foundations* (New York and London: McGraw Hill, 1934).

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It is not usual in this book to suggest the reading of novels, but the trilogy by Mrs. Pearl Buck (*The Good Earth*, *Sons* and *A House Divided*) give a picture of the Chinese peasant and the changes in the life of China (especially the southern part of the Great Plain) which are only paralleled by her husband's brilliant sociological and economic studies. R. H. Tawney's *Land and Labour in China* presents a masterful summary of the present economic position of the Chinese peasantry.

## THE NATURAL REGIONS OF CHINA

**The Loess Plateaus of the North-West.**<sup>1</sup> The great German geologist, Baron von Richtofen, was the first to describe in detail for European readers the configuration of North China, and in particular the unique development of the great deposit of loess so characteristic of the region. His theories of the origin of loess, though widely combated in the meantime by those who urged a sub-aqueous origin, are at the present day accepted

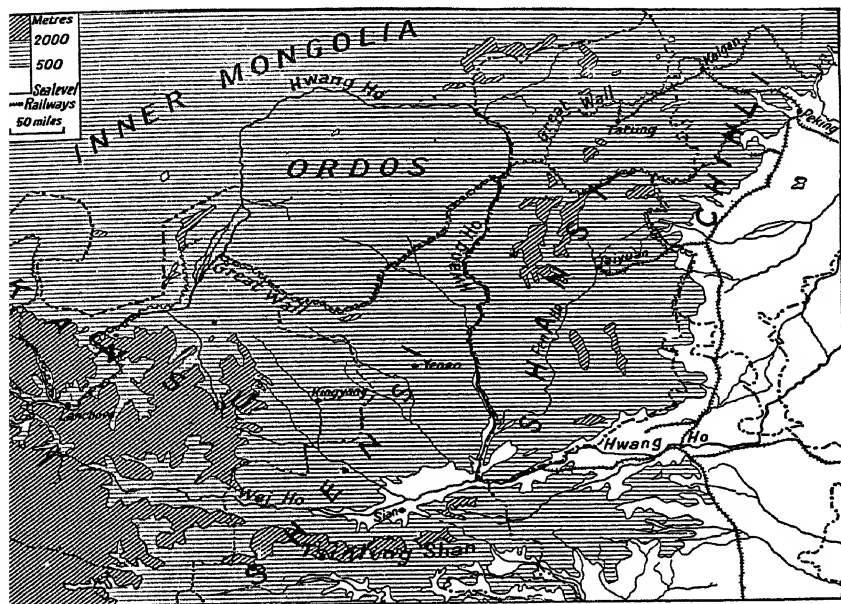


FIG. 269.—The Loess Plateau of North-west China.

by the majority of geologists in general as he formulated them. In his great work, *China*, he described how the originally mountainous, rugged outline of the country has been masked by enormous deposits of dust, swept across from the dry steppelands of Central Asia by the strong westerly winds which are still such a marked feature of the northern Chinese winter. In the

<sup>1</sup> R. S. Clark and A. C. Sowerby, *Through Shên-Kan: the Account of Clark Expedition in North China, 1908-9* (London: Fisher Unwin, 1912). Loess is the hwang-tu or yellow earth of the Chinese.

old valleys the loess may even be thousands of feet in thickness; it tails out against the slopes of the old mountains. The lower ranges of the former land surface are completely covered, the higher ranges still rise above the loess surface. The surface of the plateau is thus divided up into a succession of broad valley-plains separated by rocky ridges. Over Northern Shensi and much of Shansi each of these valley-plains constitutes a single *hien* or county; in the centre lies the 'county-town'—the *hien* city or fortress capital of the county. The whole of the province of Shensi is divided into seventy-three *hiens*, Shansi into eighty-six. The sub-aerial origin of the loess is proved by the frequent presence of land shells and bones of animals, by the absence of horizontal stratification and the banking up of the deposit against the old mountain ridges. The numerous minute vertical hollows characteristic of the deposit are believed to be due to the roots and stems of successive generations of grasses—as one grass-covered surface was buried and the vegetable matter decayed, another crop sprang up on the new surface. The minute vertical tubes affect the character of the loess in two ways. They result in a sort of vertical jointing, so that, although a very soft deposit, loess stands up in vertical walls. They also assist capillarity and the attraction of moisture, rich in fresh supplies of salts necessary for plant growth, from deep-seated sources to the surface. Hence the extreme fertility of the deposit.

The rivers of the loess plateau, notably the Hwang Ho itself,<sup>1</sup> have naturally cut deep valleys in the soft deposit, valleys with steep, almost vertical, cliffs on either side. Thus the entire course of the Hwang Ho between Shensi and Shansi is inaccessible to wheeled vehicles. In the course of long ages the ceaseless plod of animals and human beings along the cart-tracks has worn the tracks into deep ravines, it may be a hundred feet deep between vertical walls. The erosion has been unequal and, though the surface of the plateau may be level, the roads rise and fall and wind about the country in an amazing way. Along the sunken roads the inhabitants have excavated their dwellings out of the walls. Simple earth caves have now given place to storied houses with wooden doors and windows and often quite elaborate interiors—houses which are warm and dry in winter, cool and dry in summer.<sup>2</sup> To one standing on the surface of the plateau the roads, rivers and dwellings are hidden—the eye sees

<sup>1</sup> F. G. Clapp, 'The Hwang Ho, Yellow River', *Geog. Review*, Vol. XII, 1922, pp. 1-18.

<sup>2</sup> Details, with pictures, of these dwellings are given by M. L. Fuller and F. G. Clapp, 'Loess and Rock Dwellings of Shensi, China', *Geog. Review*, Vol. XIV, 1924, pp. 214-226.

othing but a flat or gently rolling surface of cultivated land unhabited save by an occasional peasant at work in his fields.

It is obvious that such a country of sunken rivers cannot be irrigated—except in certain of the broader valleys—and cultivation depends upon natural rainfall. The natural fertility of the soil makes this a great granary with endless fields of golden wheat, millet, Kaoliang, barley and maize, together with cotton, tobacco and ground-nuts in normal years, but a region peculiarly able to famine should the rains fail. Little in his *Far East* states that a normal crop year has occurred recently only once in every three years, thus accounting for the but moderate density of population in the loess plateau.

The description given above of the loess country applies particularly to Northern Shensi. Kansu, to the west, is much drier, with a precarious rainfall, and is but thinly populated.<sup>1</sup> The long north-western extension of the province of Kansu is really only a 'corridor' to the Chinese 'New Dominion', a name commonly applied to Chinese Turkistan. In the province of Shansi the rich loess valleys are smaller, the area of rugged mountains much greater. In fact Shansi consists in the main of a succession of ranges running from south-west to north-east and interspersed by loess-filled valleys. The eastern and southern boundaries of the province coincide with the edge of the plateau, overlooking the Great Plain of North China. It is believed that the reckless deforestation of the once thickly wooded mountains of Shansi has been largely responsible for the decreased productivity of the valleys. The monsoon rainfall runs off rapidly from the mountain slopes and instead of fulfilling its proper function of watering the Shansi loess plains, rushes headlong to contribute to the disastrous floods in the Great Plain of North China.

To the north of Shensi lies the Ordos Plateau—an almost desert tract lying in Mongolia, enclosed by the great northward sweep of the Hwang Ho.

A huge coal-field underlies a great part of Shansi, of such quality and disposed in such gently folded and easily worked seams that Shansi is often regarded as potentially a second Pennsylvania.

The position of the towns in the loess plateau has already been explained; naturally the larger towns are in the heart of the larger plains. Lanchow and King-yang may be noted in Kansu; Yen-an in Shensi and Tai-yuan, the historic provincial

<sup>1</sup> For recent conditions, see E. Teichman, *Travels of a Consular Officer in North-West China* (Cambridge, 1921), also *Geographical Journal*, Vol. XLI, 1916, and Vol. LII, 1918. The difficulties of transport render impossible the export of bulky produce; hence a considerable production of opium and tobacco.

capital, in Shansi. The only railways penetrating on to the loess plateau are the one to Tai-yuan and the Peking-Paotow line. Northern Chihli, with the historic capital of Shangtu, is really an extension of the region under consideration ; here lies also Kalgan—frontier town for Mongolia. The great city of Lanchow, the capital of Kansu, is built on both banks of the Hwang Ho which was crossed, until recently, by the 'bridge of boats', over 600 feet in length, and famed throughout China as the most beautiful bridge in the world. It was replaced in 1909 by an American steel bridge. This is the only bridge over the river until the Peking-Hankow railway bridge is reached. The bridge is crossed by the famous old 'silk road' to Chinese Turkistan ; the chief industries of the town now are connected with the tobacco and fur brought from the west. The fertile valley round Lanchow is irrigated from the river by so-called 'Persian' water-wheels. The winters in Kansu are sufficiently severe to cause the freezing of the river for six weeks.

The Great Wall<sup>1</sup> forms the northern boundary of China for something like a thousand miles, running across the loess plateau. The inhabitants of Shansi are, to this day, sturdy mountain folk, and that they were greatly feared by the plain-dwellers is evidenced by a branch of the Great Wall which forms part of the eastern boundary of Shansi.

**The Wei Ho Valley.** This small but important region lies between the loess-covered plateau to the north and the Tsinling Mountains on the south. This east-west strip thus separates the northern portion of Shensi from the southern and centres round Si-an, the provincial capital. The Wei Ho is a tributary of the Hwang Ho which it joins at the great bend of the latter. The Hwang Ho, after a southern course of about 500 miles through the loess plateau, turns sharply eastwards and forms the boundary between Shansi and Honan before emerging on the Great Plain. Together with the Wei Ho Valley may be considered this easterly course of the Hwang Ho roughly from Pachow to the city of Honan. A fertile, loess-covered valley, this region is densely populated and intensely cultivated, but its principal call for special consideration is its claim to be the cradle of Chinese civilization. Si-an, in the fertile plain at the foot of the lofty Tsinling range, is famed, under the ancient name of Chang-an, as having been the capital of the Chinese Empire under two dynasties—for 426 years from 206 B.C. to A.D. 220 and again for a short while in the sixth century A.D. Even for the first two thousand years after its emergence from the Wei

<sup>1</sup> F. G. Clapp, 'Along and Across the Great Wall of China', *Geog. Review*, Vol. IX, 1920, pp. 221-249.



valley itself, the old Chinese civilization was confined to the Hwang Ho basin—including the valleys of such tributary streams as the Fên and Lo.<sup>1</sup>

**The Great Plain of North China.** Lying between the

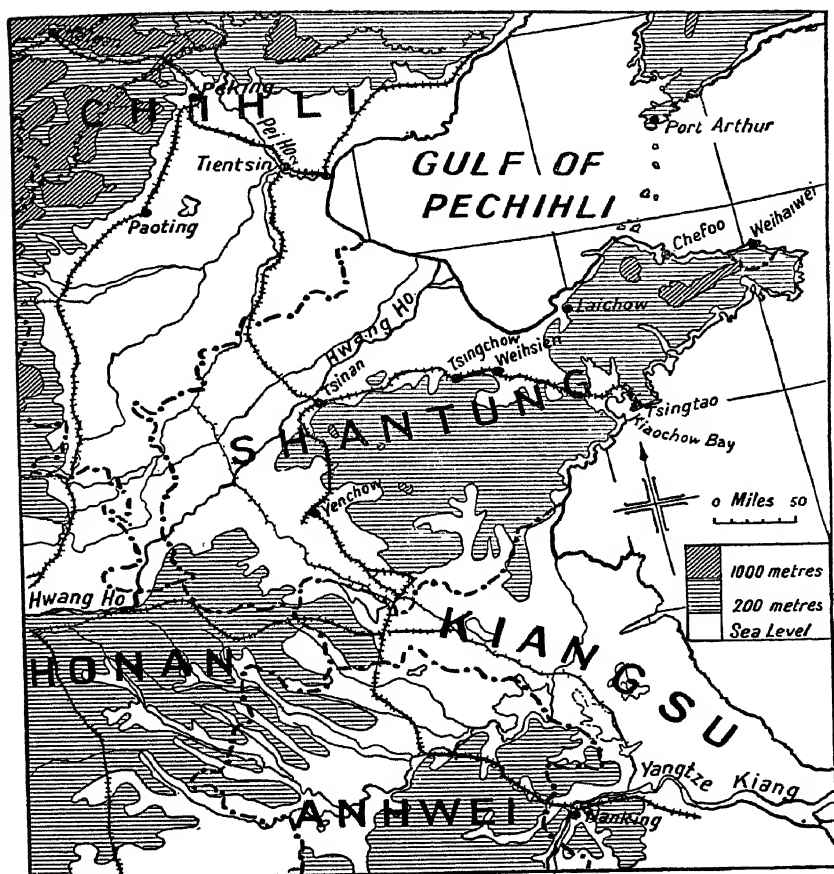


FIG. 270.—The Great Plain of North China and the Shantung Peninsula.

edge of the Loess Plateau of Shansi on the west and the Gulf of Pechihli or the Shantung highlands on the east, the Great Plain of North China occupies a large part of the province of Chihli,

<sup>1</sup> C. W. Bishop, 'The Geographical Factor in the Development of Chinese Civilization', *Geog. Review*, Vol. XII, 1922, pp. 19-41. Note the importance of the valley as a great east-west route.

the western portion of Shantung and the north-east of Honan, whilst southwards it fades into the Yangtze Delta region through the provinces of Anhwei and Kiangsu. Originally occupied by a shallow sea which separated the mountainous Shantung island from the mainland, the Great Plain is built up of a series of marine gravels and sands covered with a superficial coating of alluvium. The alluvium, which consists largely of redeposited loess, has been laid down by the numerous streams which flow down from the plateau of Shansi and empty themselves into the shallow and decreasing Gulf of Pechihli. The great Hwang Ho itself has, since 1852, flowed into the same gulf, but prior to 1852 emptied into the Yellow Sea south of the Shantung Peninsula. Within historic times the Hwang Ho has had a large number of different lower courses, and the behaviour of this great river may be taken as typical of the rivers of the Great Plain. In its passage across the plain there is but a slight fall, and the great burden of fine sediment brought down in the high-water season is deposited in the bed of the river. In order to confine the water, mud and straw embankments, sometimes faced with masonry, are built on either side. Were it practicable to the peasants who carry out the work of embankment, the obvious expedient would be to dredge the river-bed rather than build up artificial sides. Soon the bed of the river is well above the level of the surrounding plain. Sooner or later a breach and a serious flood are inevitable and the river which has temporarily ruined thousands of farms finds a new course and permanently ruins all those lands lying in its new path. Well has the Hwang Ho been named 'China's Sorrow' and not until a stable government undertakes modern river-training works on a huge scale can the Great Plain hope to be free from the disastrous floods, at present almost a yearly occurrence.

But the soil, despite wide marshy tracts in some parts and saline incrustations through the long dry season in others, is fertile and the hard cereals—millet and wheat—afford a better diet than the rice of the south. The cold winters, too, and a strain of Tartar blood have helped to produce a fine sturdy race beside which the Southern Chinese appear almost effeminate. Protected to some extent by the plateau wall from the extreme force of the biting winter winds, the plains of Chihli appeared an earthly paradise to the nomadic Mongols of the plateau. The branch of the Great Wall which now separates Chihli from Shansi bears witness to the struggle of the plains-dwellers to keep the Tartar hordes at bay; the very foundation of the northern capital, Peking, in the north of the Chihli Plain, was a definite measure to the same end, and it is only within the last

few centuries that the menace has disappeared. Now the tide has turned, and the peaceful agriculturists of the plain are pushing further and further on to the plateau and adding year by year another and another strip to the agricultural lands of China. Kalgan, definitely on the plateau, is the centre of a thriving agricultural country.

Through the Great Plain from north to south has been cut the Grand Canal or Grain Canal, the construction of which is associated with the great emperor Kublai Khan. The network of lakes, canals and other waterways into which the canal passes in Kiang-su, is comparable in character with the Yangtze Delta and the region is more appropriately considered with that area.

Foremost among the cities of the Great Plain is the northern capital, *Peiping* (Peking). Founded in A.D. 920, it is quite a modern city compared with many in China. Successively a capital under the Liao, the Kin Tartars and the Mongols, it was supplanted in 1341 by Nanking which the conquering Ming made their capital when they had driven the Mongols out of Peking. But renewed Tartar invasions caused the Ming to remove to Peking in 1368, since when it reigned supreme until 1928. The city is in the form of a parallelogram enclosed by high walls of brick. The old Tartar city (the Chinese city is outside) was  $1\frac{1}{4}$  miles from north to south and 4 miles from east to west and in its broad streets and spacious plan resembles a Central Asian city rather than one of the typical conglomerations of narrow alleys which make up so many Chinese cities. A forbidden city until 1901, the opening of the sacred Tartar city to foreigners resulted from the Boxer rising and its suppression. The railway invasion of the city dates from the same epoch.

*Tientsin*, on the Pei Ho, is the port of Peking and a great commercial city of the Northern Plain. The river is here 300 yards wide and lined with wharves for steamers and junks. Cotton mills have long existed in the city itself. As in Peking, the changes which followed the Boxer troubles were far-reaching. The old walls were pulled down, wide roads constructed and river navigation improved. *Paoting*, although the provincial capital of Chihli, is a relatively unimportant city, and the eighty million people of the plain live mainly in small villages.

**The Shantung Peninsula.** The Province of Shantung, excluding the western strip which forms part of the Great Plain of North China, consists of a mass of ancient mountains rising like an island from the plain on the west and the sea on the east. It was, indeed, actually an island when the sea occupied what is now the Great Plain. Structurally, the Shantung

massif of ancient rocks is linked with the Liaotung Peninsula and the mountains of Eastern Manchuria and Korea, and the Miao Islands exist to show the former land bridge across the Strait of Pechihli. The Shantung highlands are cut into two portions by the Tsingchow-Kiaochow Valley, the eastern portion forming the peninsula, properly speaking. The eastern portion consists of ancient granitic and metamorphic rocks; the western portion of limestones and other sedimentary rocks including some rather poor coals. The precipitous, rocky coastline, not infrequently fog-enwrapped, is interrupted at intervals by magnificent natural harbours. The commanding position of the peninsula and the excellence of these harbours attracted the attention, not only of Japan and Russia, but of the great European powers who had interests, actual or potential, to protect in the Pacific. After her victory over China in 1894-95, Japan occupied part of the Peninsula, but withdrew her troops on pressure from Russia, Germany and France. A short while afterwards, in November, 1897, however, Germany seized the territory round Kiaochow Bay to indemnify for the murder of two German missionaries. A ninety-nine years' lease was arranged in 1898 and Germany spent huge sums in developing the territory and transforming the fishing village of Tsing-tao into a great port. In particular, the extensive reafforestation of the bare hills, the regulation of watercourses, the constructing of the railway terminating at Tsing-tao and the dredging of the bay are works of permanent importance carried out by the Germans. Early in the Great War (1914) the territory was captured by Japan, but in accordance with the Washington Pact was restored to China in November, 1922.

The territory of Wei-hai-wei, near the tip of the peninsula, was leased by Great Britain by a convention with the Chinese Government, dated July 1st, 1898. The obtaining of this lease was a defensive measure against the Russian lease and occupation of Port Arthur earlier in the same year. The area of the leased territory was 285 square miles and had 154,416 inhabitants in 1921 (mostly farmers and fishermen). Like much of the remainder of Shantung, the territory consists of rocky hill ranges and picturesque fertile valleys. Much was done in afforestation, the making of roads and the development of trade, before the territory was restored to China in 1930.

The hills of Shantung are barren and useless and illustrate in a very remarkable way the evils of soil erosion resulting from deforestation. In the fertile valleys, the intensive agriculture characteristic of North China is in evidence with populations up to 3,000 and 4,000 per square mile, together with a thousand

cows, donkeys and swine. Agriculture depends upon rainfall, or rainfall aided by irrigation from shallow wells. Wheat and millet are among the chief crops. The Shantung silk moths are fed mainly upon oak leaves, though mulberry-trees are being planted and grow well.

The sturdy Shantung people emigrate temporarily in numbers to Manchuria, or as coolies to Shanghai. In Chinese history Shantung is famous as the home of Confucius and of his great disciple Mencius.

The Treaty port of Chefoo is an important port and trading centre. Amongst inland towns should be noted Laichow, Tsingchow and Weihsien (the colliery town). On the border of the Great Plain are Tsinan and Yenchow.

**The Szechuanese Alps.** This name is a convenient one to use for the belt of mountainous country lying mainly in the Province of Szechwan to the north-west, west and south-west of the famous Red Basin. The Min River, which the Chinese themselves regard as the true upper course of the Yangtze and which is of such incalculable value to the Chengtu area of the Red Basin, rises amongst these mountains. The Upper Yangtze itself, as understood by European geographers, after rising in Tibet and racing southwards into Yunnan, turns north-eastwards and follows a tortuous course through this mountain region, forming the boundary between the provinces of Szechwan and Yunnan and roughly between the mountain zone and the Yunnanese Plateau.

The Chengtu Plateau is bounded on the north and west by the Ching-Cheng Shan, or 'Azure Wall Range', which is indeed a veritable wall. Vertical limestone cliffs rise sheer from the cultivated fields of the plain and through this wall break, in gorges and narrow valleys, the rivers and mountain torrents from which the irrigation waters of the plain are drawn. The Azure Wall, seen from the plain, is two or three thousand feet high, but behind it rise range upon range, culminating in snow-covered peaks of 20,000 feet and over in height in the 'Great Snow Range'—the Himalayas of China. These successive ranges form the steps up on to the north-eastern extension of the Tibetan Plateau which lies beyond.

To the south-west of the Red Basin there lies the tangle of mountains which separate it from the Yunnanese Plateau. Included in this tract is the Liangshan, or Terrace of the Sun, a wild range inhabited by the independent Lolo and round which sweeps the Kinsha (or Upper Yangtze) in a continuous series of rapids.

Needless to say, the Szechuanese Alps as a whole form a

thinly populated region, inhabited mainly by independent mountain tribes.

For a description of some of this country, see H. G. Thompson, 'From Yunnan-fu to Peking along the Tibetan and Mongolian Borders', *Geographical Journal*, Vol. LXVII, 1926, pp. 2-27.

**The Red Basin.** Occupying the heart of the province of Szechwan, the Red Basin <sup>1</sup> is one of the most remarkable regions in the world. Hemmed in on all sides by a girdle of mountains, the basin was occupied in Cretaceous and Tertiary times by a great lake in which were deposited the red sandstones from

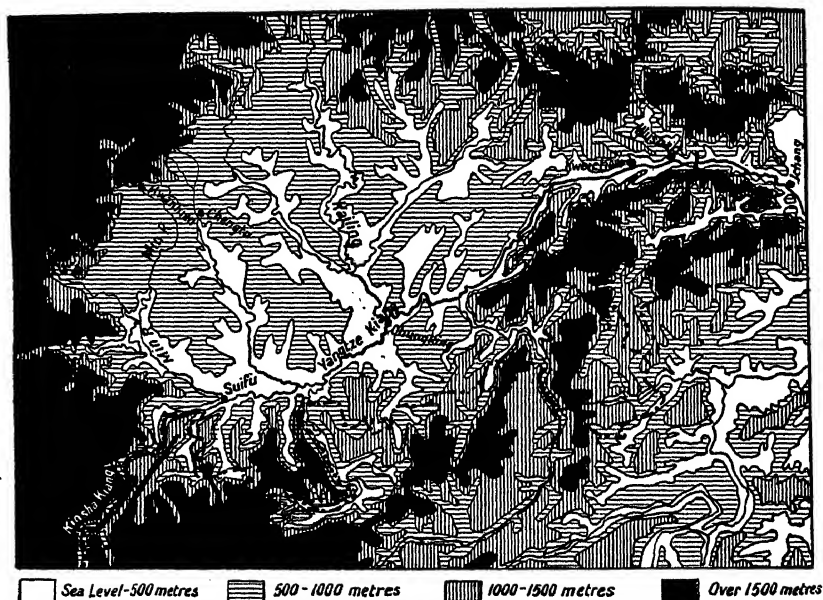


FIG. 271.—The Red Basin.

which the basin derives its popular name, and which was drained when the outflowing stream cut the famous gorge between Kweichow and Ichang. The old lake-basin was crossed by a series of limestone ridges, all trending north-north-east and south-south-west. The red sandstones fill in the hollows between these ridges and are banked up against them. When once the main Yangtze Gorge was cut, erosion got to work on the soft sandstones, giving rise to a fantastically rugged landscape, extremely picturesque. Every stream, large and small, has cut

<sup>1</sup> A. Hosie, *Szechwan: Its Products, Industries, and Resources* (Shanghai: Kelly and Walsh, 1922).

its way down and flows in a steep ravine. The Yangtze itself has worn a valley a thousand feet below the level of the sandstones of the basin and cuts through the cross-ridges of limestone in a series of magnificent gorges. The Yangtze flows from west-south-west to east-north-east near the southern border of the basin; flowing in from the north are the tributaries which give rise to the four main valleys in the red sandstone plateau. The name Szechwan actually means 'Four streams'. From west to east there are:

- (a) The Min Valley. The Min is regarded by the Chinese as the true upper course of the Yangtze. Though much shorter than the other head-stream (the Kinsha Kiang), it usually has as large a volume of water and is of use as a navigable waterway, which the Kinsha is not. The two unite at Sui-fu. The Chengtu Plain, in the upper part of the Min Valley, will be mentioned later.
- (b) The Chung Kiang (or Central River) Valley.
- (c) The Fu Kiang Valley, and
- (d) The Kailing Valley. The two latter unite a few dozen miles above their junction with the Yangtze at Chungking.

These four great north and south valleys comprise the richest agricultural land of the Province of the Four Streams.

The whole of the Red Basin, with the exception of the Chengtu Plain, is thus divided up into deep ravines and high ridges. But it is well watered, the rocks almost dripping with moisture, and the hill-sides have been terraced from base to summit. The farmers produce a varied succession of crops: rice, wheat, maize, beans, sugar, hemp and tobacco. Oranges are widely grown, whilst silk is one of the leading products of the region. The well-known 'T'ung yon,' or Dryandra oil, comes from this area. In the words of Little<sup>1</sup>: 'The climate of the Red Basin is warm and damp; there is practically no winter, frost and snow being unknown except on the hill-tops, their place being taken by drizzling rains: thus the country is always green and never without crops; no sooner is one crop ready for reaping than another is seen sprouting in the intervening furrows.' But the sun appears so seldom that, according to a local proverb, the dogs bark when the sun shines. The rains in summer are heavy and continuous and landslips are frequent, the terraced hill-sides being stripped of their soil, which has then to be carefully replaced by the untiring farmers. Five and six crops a year are rendered possible by the use of cesspool manure from the many populous towns.

<sup>1</sup> *The Far East* (Oxford, 1905).

Amongst the minerals of this remarkable area, coal has already been mentioned. It crops out frequently on the sides of the ravines, and has long been the principal fuel of the basin. The salt production from the brine wells is an important item in the provincial revenue.

The principal lines of communication in the Red Basin are the rivers. The four main streams and the Yangtze fall about 500 feet in the 200 miles across the basin, but the Chinese boatmen force their craft over apparently hopeless rapids and there is an unending traffic. The land roads traverse the country in all directions, but are nothing more than narrow tortuous footpaths interrupted by successions of stone staircases, often cut from the solid rock, where they cross the ravines.

The very dense population of Szechwan consists, at the present day, mainly of immigrants from Hupeh, Kiangsi and other eastern provinces who replaced the earlier inhabitants who were virtually exterminated by a Shansi war lord in the seventeenth century. The pressure on the land from the present immense population is very severe and cultivation is being pushed further and further into the surrounding girdle of mountains, especially towards the Tibetan Border.

*The Chengtu Plain.* Though lying within the limits of the Red Basin, the Chengtu Plain deserves special treatment as a sub-region. It is a tract of about 2,800 square miles of roughly level land in the otherwise purely mountainous province. Ascending the Min River from its junction with the Kinsha, by a series of rapids one arrives, after a journey of about 200 miles, on to the Chengtu Plateau, which itself has a marked slope from north to south. It is the bed of an old lake and has a subsoil of boulder-filled gravels. Only the ancient and very ingenious irrigation system has prevented the plain from remaining a desert of boulders in the north and a useless swamp in the south. At Kwan-hien, where the Min emerges from its gorge through the Azure Wall Range, Li II, a gentleman of blessed repute, whose very name is unknown, carried out the double scheme of controlling the main stream by caissons and cutting a channel to divert part of the water due east where it intercepts numerous mountain streams and eventually distributes the collected waters over the whole plain. Li II was the son of Li Ping who overthrew the Shu kingdom in 215 B.C., and the success of his irrigation scheme through more than two millenia is largely due to the observance of his maxim 'Dig deep the bars; keep low the dykes'. The Great Plain of North China would have had a much happier history had this maxim been observed there, where the dredging of the river-beds is entirely ignored. One



of the great features of the irrigation system is the artificial multiplication of channels and the control of the waters by what appear to be flimsy bamboo fences. Though the principal dykes are elaborate masonry erections dating from the thirteenth century, when molten iron was used to fill the interstices, the use of a bamboo network for temporary works is still of great importance. The density of population made possible by the irrigation works is almost incredible—more than 4,000 to the square mile in places. Unlike many irrigated tracts, the Chengtu Plateau is well-wooded. The water courses are lined with trees, the numerous fine monasteries are surrounded by groves of forest trees and bamboo thickets, the farms have their orange and other fruit orchards and the agricultural fields appear almost hidden.

The most remarkable feature of the Red Basin, including the Chengtu Plain, remains to be mentioned. That feature is its inaccessibility. Completely shut off from the outside world the Red Basin is self-sufficing, producing all the necessities of life and thus able for centuries to lead a self-contained life. If we exclude the 500 miles of mountain path from Yunnan-fu, the chief entrance to and exit from the Red Basin is by the Gorge of the Yangtze—between Kweichow and Ichang—in the centre of which lies the Great Gorge of Wushan, 22 miles long. Specially constructed boats can pass through the gorge during the greater part of the year; a road has been constructed high up on the flanks, but is in an indifferent state of repair. A railway along the same line has long been discussed. But at present the trade which passes in or out of the Red Basin is in the hands of those intrepid navigators who force their frail craft through the rapids, or the human porters who brave the perils of the highway above.

**The Central Basins.** Emerging from the gorges which cut off the Red Basin from the rest of China, a little above the Treaty port of Ichang, the Yangtze makes its way across a succession of three level basins before entering the deltaic area near Nanking. These three plains have many features in common and may be considered together as one natural region, that of the Central Basins. It is probable that the waters of the Yangtze originally found their way to the Pacific Ocean through a series of lakes, and the flat alluvial stretches of the Central Basins represent the floors of these infilled lakes. In each of them, there indeed still exists a fragment of the ancient lake and, in times of severe flood, the whole country-side reverts once again to what must have been its prehistoric character.

(a) The Upper Basin is the largest and is cut into a northern

half, lying in Hupeh, and a southern half, lying in Hunan, by the Yangtze itself. The river enters the basin at Ichang and leaves it in the narrow winding channel of 'Split Hill' below Hankow. The large shallow lake of Tungting, south of the Yangtze, repre-

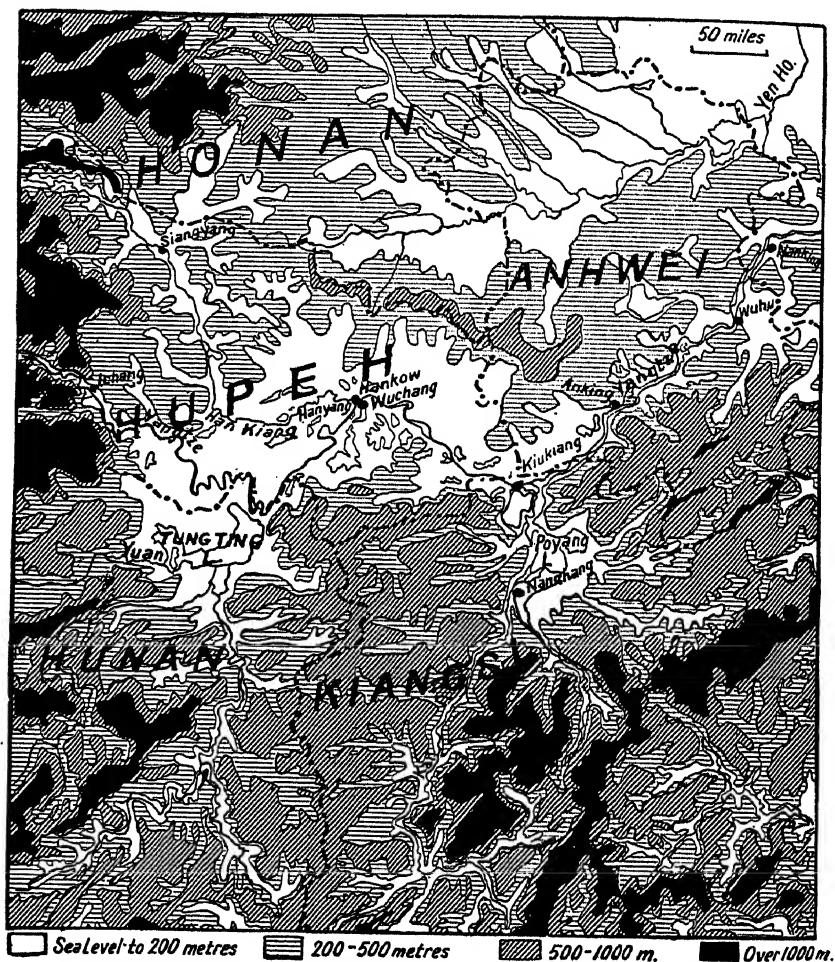


FIG. 272.—Physical map of the Central Basins of the Yangtze.

(From the maps published by the Geographical Section of the General Staff.)

sents the remnants of the original lake, whilst other smaller fragments remain north of the river. In the north the plain is continuous with the lower part of the Han Valley.

- (b) The Middle Basin is still more distinctly divided into two parts, a northern and a southern, separated by the Yangtze. In the south is the mountain-girt alluvial plain surrounding the rapidly dwindling Poyang Lake and forming the heart of the province of Kiangsi<sup>1</sup>. North of the river the plain is smaller, and stretches from Wusuch, where the Yangtze emerges from the narrows of Split Hill, to Anking, immediately below which the river flows through the narrows of 'Hen Point'.
- (c) The Lower Basin is less distinct and lies mainly to the north of the Yangtze—from below Anking nearly to Nanking. The port of Wuhu may be regarded as its centre, and lies in one of the richest rice-growing regions of China. The Yangtze makes its exit from this basin by the gate known as 'The Pillars'.

In all cases the basins are surrounded by a tangle of mountains and hills, in this part of China largely stripped bare of their original forest cover. The frequent flooding, especially of the Upper Basin, is the obvious result of the inability of the river waters to get away quickly enough through the narrows. At Hankow the normal difference between the summer and winter level is 45 feet.

The climate of the Central Basins is the climate already described as typical of Central China, with colder winters than are experienced in the Red Basin. North of the river, Hupeh grows barley, wheat and cotton, but little rice; cattle are numerous and silk-worm rearing is an important industry. South of the river, the basin of the Tungting Lake in Hunan is a great rice-growing area and large quantities are exported via Hankow to the districts north of the river. Tea and oil-seeds come mainly from the slopes of the surrounding hills. The Poyang Lake basin of Kiangsi is similar in character.

The great highway through the region under consideration is the Yangtze. Ocean-going steamers ascend normally to Hankow; large river craft to Ichang, which since its opening as a Treaty port has superseded Shansi. The lakes are shallow and of little use, but the inflowing river cuts out a navigable channel through them. Thus the Han is navigable to Siangyang; the Yuan across Tungting Lake right through Hunan to the borders of Kweichow; the Kan River right across Poyang Lake into the mountains of the south of Kiangsi Province.

One of the most important centres in China is formed by the three cities Hankow—Wuchang—Hanyang, with a combined

<sup>1</sup> See G. Wegener, *Im Innersten China* (Berlin: Scherl, 1926).

population estimated in 1925 at 1,584,000.<sup>1</sup> Hankow and Hanyang are both north of the Yangtze, the former east of the Han, the latter west of the Han. Wuchang faces them and the mouth of the Han and is on the south side of the Yangtze. Hanyang and Wuchang are both walled cities and, normally, administrative centres; Hankow, without walls and free to expand, is the commercial city. Already a focal point on the waterways, the three cities bid fair to become the leading railway centre of Central China, as well as a leading industrial centre. Wuchang manufactures silk; Hanyang has blast furnaces and steel foundries. Professor Roxby, in the paper quoted, has enlarged

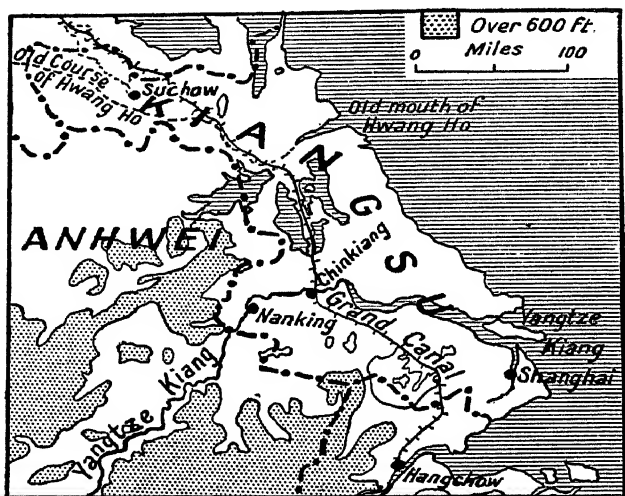


FIG. 273.—The region of the Yangtze Delta.

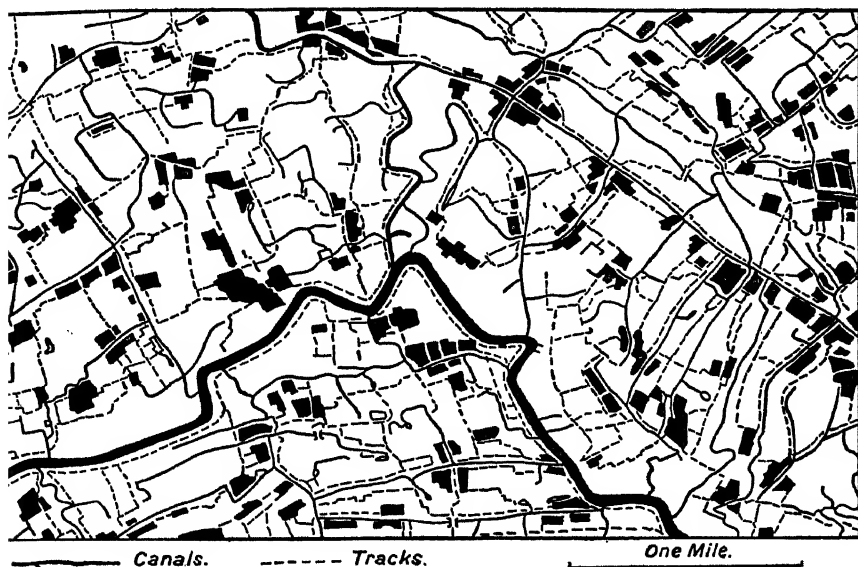
on the extreme importance of the three cities, suggesting that their unique advantages as collecting and distributing centres are without parallel, unless it be Chicago, with which they are likened.

*Kiukiang*, 140 miles below Hankow, is in the Middle Basin and is another Treaty port and the natural outlet for Kiangsi. *Anking*, the capital of Anhwei, like the other cities of the province, was devastated during the Taiping rebellion (1850-1864).

**The Yangtze Delta.** The natural region of the Yangtze Delta corresponds roughly with the province of Kiangsu. The

<sup>1</sup> P. M. Roxby, 'Wu-Han: the Heart of China'. *Scott. Geog. Mag.*, 1916. Wu-Han is the name given to the whole.

Yangtze enters the province at 'The Pillars', 20 miles above Wuking, and is tidal to this point, 200 miles from the sea. With the exception of some hills near the river itself along the north bank and a few steep hills rising like islands from the plain, the whole of Kiangsu is a vast alluvial flat. It has been described as the 'Holland of China'—it is traversed by canals and canalized streams in all directions; along the coast the land is actually low high-water level and cultivation is carried on in 'polders'. A tenth of the whole area is still covered with undrained swamps.<sup>1</sup> To the north of the province is the old course of the Hwang Ho



g. 274.—Map of a small portion of the Yangtze Delta region, showing the dense population (each black patch is a village) and the immense numbers of canals. The large canal is the Suchow Canal and the area is west of Shanghai.

and it is there that the Yangtze Delta region fades into the Great Plain of North China. The Grand Canal links the two seas, running right across Kiangsu from north to south and crossing the Yangtze at Chinkiang. The banks of the canals are lined with mulberry-trees and this is the leading silk-producing region of China. The principal food grain is rice; large quantities of cotton are grown and supply the mills of Shanghai and provide a surplus for export to Japan.

<sup>1</sup> A study of the growth of the delta has been made by H. von Hiedemann, *Jour. N. China Branch Roy. Asiatic Soc.*, Vol. LIII, 1922.

The Yangtze Delta includes within its limits three famous centres: Nanking, the 'Southern Capital'; Chinkiang and Shanghai, the commercial metropolis of China.

*Soochow*, in the north of the province of Kiangsu, belongs more properly to the Great Plain of North China, whilst on the southern limit of the deltaic region, in the province of Chekiang, lies Hangchow.

*Nanking* is an ancient walled city, the walls 50 feet high, enclosing an area of 35 square miles; it was made the capital of China by the Nationalist Government in 1928, supplanting Peking. A flourishing manufacturing city in the first half of the nineteenth century, it suffered severely during the Taiping rebellion and underwent a protracted siege by the Imperialist forces, capitulating in 1864. During this rebellion, probably half the total population of Kiangsu perished.

*Shanghai* cannot boast the antiquity of many Chinese cities. Up to the eleventh century it was nothing more than a fishing village and not until the fourteenth century became a walled city. Although destroyed by Japanese pirates in the sixteenth century, by the early nineteenth century it had become the leading port of call for sea-going junks. But the prosperity of Shanghai dates from its establishment as a Treaty port in 1843 at the instance of the British Government. There is now the old walled native city and, quite distinct, the foreign settlement. The safety, cleanliness and well-ordered municipal government of the foreign settlement has attracted over a million Chinese, so that the so-called 'foreign' settlement is to-day predominantly Chinese, except in government. Shanghai is not situated on the Yangtze, but on a tidal creek, the Wusung or Hwangpu River, 14 miles from its junction with the main river and 54 miles from the sea.

**The South-east Coast.** This region corresponds roughly with the provinces of Chekiang, Fukien and the eastern half of Kwangtung. Backed by high mountains, which form an adequate barrier from the centre of China, the outlook of the region is towards the sea. With the exception of the valley bottoms and certain narrow coastal strips, the whole region is mountainous. The productive land, the villages and towns are all concentrated near the coast itself. The region lies between the Yangtze Delta on the north and the Si Kiang Delta on the south-west. At the northern end Hangchow is the liaison city with the Yangtze Delta; at the south-western end Hong Kong is in, but scarcely of, the region.

In contrast with the bare, deforested hills further north, the mountains and higher hills of this region are forested; the

ss rugged hills are terraced and covered with tea gardens, orange, lemon and mulberry groves, or with fields of barley, wheat, cotton, or beans. Rice is the chief crop on the flat stretches around the river mouths. The scenery of much of the coast is very fine, especially the Min River. The leading ports and towns along the coast are Ningpo in Chekiang; Foochow and Amoy in Fukien, and Swatow in Kwangtung.

The geographical isolation of this region is evidenced in several directions. Like other regions of China, over-population is general; here the obvious outlet is by sea, and so it is the Chinese from this region and the neighbouring Si Kiang Delta who find their way abroad—to Malaya, the East Indies, India, the Philippines and America. Except amongst the upper classes, there is comparatively little foot-binding of the women. The dialect, especially in Fukien, is entirely distinct from the rest of China, and it was the Fukienese who were the last to be conquered by the Manchus. Even the dress at the present day is slightly different from that affected in other parts of China, specially in the use of a black turban.<sup>1</sup>

An interesting detailed study of North-eastern Chekiang, by Thomas Goodchild,<sup>2</sup> calls attention to a transition region south of the Yangtze Delta and to the position of Ningpo on an alluvial plain in the midst of a district of subdued hills—a level plain from which the hills rise abruptly. The canals form a network over the plains and take the place of roads. The hills are often barren and soil-less.

**The Plateau of Yunnan.** The province of Yunnan has an area of 146,680 square miles—considerably larger than the British Isles—but has a population of only 7,000,000 or 8,000,000. Yunnan is a lofty wind-swept plateau, a continuation of the great plateau of Tibet. Its very name 'South of the Clouds' indicates the contrast with the misty Red Basin to the north-east. In the north-west of the province of Yunnan—which is roughly coextensive with the natural region—is that remarkable area where three of the world's mightiest rivers—the Salween, Mekong and Yangtze—race southwards in huge parallel trenches at the most a few dozen miles apart. These gorges appear to cut the country into north-south ranges and tend to obscure the true plateau character of the country. Further south the plateau lies at an average elevation of 6,000 to 7,000 feet. Numerous

<sup>1</sup>The contrast with other parts of China is emphasized by the development of forestry: almost every Fukien farmer owns a grove of trees—pines and firs—carefully cleared, protected by fire-breaks and tended. Bamboo is also of such importance that it is a current belief that no civilization could exist without it!

<sup>2</sup>'North-eastern Chekiang, China: Notes on Human Adaptation to Environment', *Bull. Amer. Geog. Soc.*, Vol. XLIII, 1911.

narrow, fertile, but unhealthy valleys interrupt the surface and render communication difficult. The fertility of these valleys attracts farming, but the farmers are compelled to live in villages often many hundreds or even thousands of feet above the fields. Towards the south and east the surface of the plateau drops and the region lies in the drainage of the Red River of Indo-China. This portion of the plateau has been tapped by the railway from

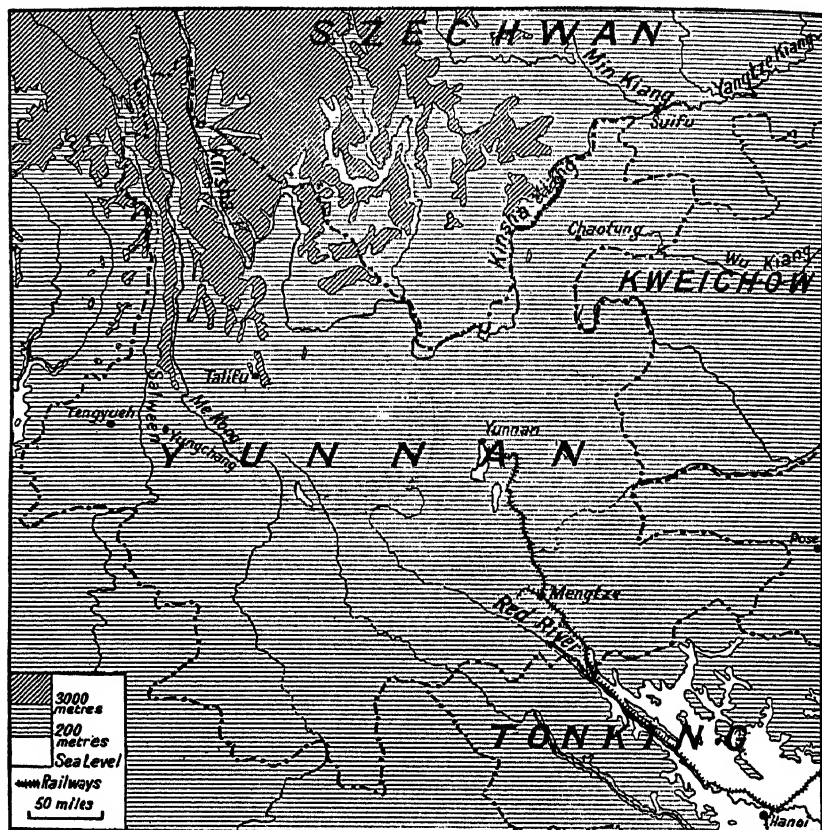


FIG. 275.—The Plateau of Yunnan.

Hanoi to Yunnan. In the south-west of Yunnan, on the borders of Siam and Burma, the fertile valley plains are larger and the land richer and rice is an important crop, whereas in the north and east maize is the chief food grain, rice the diet of the rich. The opium poppy is widely grown in Yunnan. Yunnan is undoubtedly very rich in minerals; it is outstanding in this respect among the provinces of China. Coal of poor quality occurs, and traces of petroleum occur in old lake-basins, but the



wealth of the area is in metallic minerals. Gold occurs all over Yunnan—it was panned in 430 out of 700 streams tested in 1911-13—but the gold is all alluvial and does not occur in sufficient quantities to justify importation of machinery to so inaccessible a region. For centuries past natives have traded the gold of Yunnan for the jade of Burma. Antimony ores occur in the Chinese Shan States and are worked by modern methods just above Mengtsz on the Tongking-Yunnan Railway. Copper in large quantities is obtained by primitive methods, Yunnan being the richest copper-producing province of China. Argentiferous galena is worked in various areas, especially near the Burmese border. Spelter—an alloy of copper, lead, and zinc—is used extensively in China in making cash currency and is exported in considerable quantity. Tin is mined at Kochin—about 20 miles west of Mengtsz—and has been for many years. Tungsten, arsenic and mercury are among the other minerals of Yunnan, whilst iron is mined in almost every part of the province.

It is curious that Yunnan, a province so rich in minerals, and with by no means an unfavourable climate and soils, should remain so undeveloped. Little has compared its situation in elevation and latitude with the Transvaal. A large proportion of the inhabitants are aborigines, allied to the Burmese and Siamese, and known to the Chinese as Miaotse. Difficulty of access and of east-west communication only furnish partial explanations of the backwardness of the province, which never seems to have flourished under Chinese rule. Perhaps it is because Yunnan is linked geographically with sparsely populated Indo-China. The outlet of the main part of the region, including the large centres of Talifu, Yunnan and Mengtsz, is via Tongking, whilst the south-west, including Teng-yueh (Momeim), is more accessible from Burma via Bhamo. It is only the third and fourth of the main approaches which connect Yunnan with the rest of China—the Yangtze route from Yunnanfu to Suifu at the junction of the Min and Yangtze and the Si Kiang route from Yunnan-fu via Posé to the Si Kiang. The remoteness of Yunnan is seen when one remembers it is 2,000 miles from Peking, and that in the old days it took officials appointed from Peking four months to cover the hundred stages necessary to reach their posts.

**The Si Kiang Basin.** The Si Kiang Basin corresponds roughly with the province of Kwangsi and the eastern half of Kwangtung. With this region may be included also the coast of Eastern Kwangtung and the island of Hainan. The Tropic of Cancer passes through the heart of the region, and the climate is, on the whole, comparable with that of India and may be

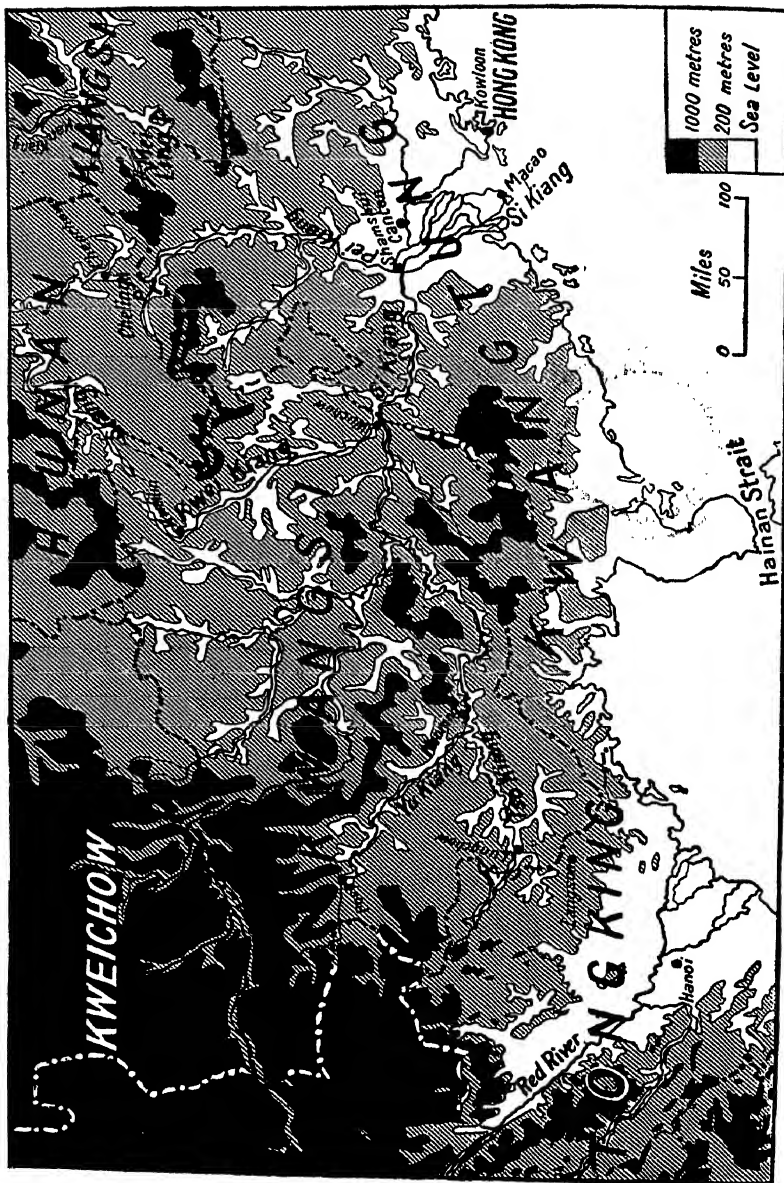


FIG. 276.—The Basin of the Si Kiang and South China.

classed as tropical monsoon in type: so that rice becomes the great staple food crop. The valley of the Si Kiang is much smaller than that of the Yangtze; the area of lowland is limited, but there are many points of resemblance between the two basins. Like the Yangtze, the Si-kiang cuts through the limestone ranges across its path in a series of fine gorges. A northern tributary, the Kwei Kiang, on which stands the town of Kweilin (the capital of Kwangsi), rises on the borders of Hunan and is joined by a short canal with the upper waters of the Siang River, thus affording through water communication with the Yangtze system. A southern tributary, the Tso Kiang, or Left River, rises in Tongking and affords an easy means of communication to Langson, just on the French side of the border, from whence there is a railway to Hanoi.

Aborigines are numerous in the region; the Chinese are largely confined to the fertile river bottoms, where rice is cultivable, and more than half the 'counties' into which Kwangsi Province is divided are normally under 'Miao' headmen. It is interesting to notice that the Chinese long ago recognized the essential geographical unity of the Si Kiang Basin by uniting the Kwangsi and Kwangtung Provinces as one viceroyalty, with headquarters at Canton. The events of the past few years have also stressed the separation of South China—almost synonymous in popular thought with Canton—and North China with Hankow, Nanking and Peking as its foci.

If the Si Kiang Basin is a geographical unity, there is nevertheless a marked contrast in economic development between Kwangsi, the upper part of the basin, and Kwangtung, the lower part. Kwangsi, almost wholly mountainous, as already stated, is still inhabited largely by aborigines. Hence Lungchow, though a Treaty port and near the railhead of the French railways, has little trade. Nanning is more important because it lies on the Pearl River, and thus commands the route up that river to Posé and Yunnan. Wuchow, the most important town in Kwangsi, occupies a position on the Si Kiang comparable with that of Hankow on the Yangtze. It lies at the junction of the important and navigable Kwei Kiang and Si Kiang and is accessible by steam vessels of considerable size from Canton. It is the collecting centre for the cassia, cinnamon and mace, as well as cabinet woods, for which Kwangsi is famous.

The province of Kwangtung, by way of contrast, although not one of the largest of the provinces of China, is one of the most densely populated and perhaps the most important. Long before the rise of Shanghai, Canton was the gate to China for the Western world and at least partly open years before other

parts of the country. The energetic and active Cantonese are less tied to their native soil, rich as it is, and it is the Cantonese who have penetrated to the new lands of South-east Asia. The energy of the Cantonese sometimes makes itself felt in undesirable channels—it was the Hakka section of the province which was the cradle of the Taiping rebellion; more recently the rise of the Kuomintang is associated with Canton; piracy by river raiders, whose lairs lie amongst the numerous channels of the Si Kiang Delta, has been a feature of the last few years. When the writer visited China in 1925, it was the Canton River which bore the most warlike appearance, with every little river boat armed—even if only by a rusty rifle sheltered by a battered petrol tin.

The province as a whole is mountainous—with bare deforested hill-sides. Granite forms many of the higher ranges such as those which overlook the 'New Territory' of Hong Kong and form the mountainous island of Hainan. In the middle of the mountainous complex is the triangular delta, each of its three sides measuring roughly 100 miles. The delta and the river valleys are well-watered—the rainfall being over 60 or 80 inches—and given over to rice cultivation. Subsidiary crops include sugar, tobacco, oil-seeds and silk.

Canton is still one of the most fascinating cities of the East. Lying on the west bank of the Canton River, it is nominally connected with Kowloon (Hong Kong) by rail, but the service has been irregular for some years and Canton is approached by a regular service of steamers from Hong Kong or direct by ocean-going vessels. The heart of the city is a maze of narrow tortuous alleys, lined with shops and paved with large flagstones. No wheeled traffic is possible, but there is a ceaseless stream of foot-passengers and an occasional sedan-chair conveying a rich merchant or a Chinese general—if the latter, it will probably be preceded by a bodyguard with drawn revolvers. Wider streets with large 'stores' surround this old centre, and just to the north, separated from the city by a stream only a few feet wide, is the island of Shameen, the residential and business quarter of the Europeans. Until the opening of the coast ports Canton was the port of entry for the whole of China: the road to the interior lies up the North River (Pei Kiang) to the Meiling (Plum-tree Pass), a low notch only a thousand feet high, which separates the headwaters of the Pei Kiang from those of the Kan of Kiangsi. Further east is the Lesser Meiling or Cheling Pass, leading to Chenchow in Hunan. One day the long-promised Canton-Hankow Railway is to follow approximately this line; at present human beings are still the beasts of burden, bearing

travellers in sedan-chairs or merchandise suspended from the inevitable pientan, or carrying pole.

Canton overshadows the other urban centres, which include Samshui, a Treaty port at the junction of the West and North Rivers, with a large junk trade; Chaoking, on the West River, once the resident of the viceroy; and Shaochan, on the North River.

To the east of the mouth of the Canton River lies Hong Kong, to the west the Portuguese territory of Macao. The Portuguese obtained permission to settle in Macao under the Ming Dynasty in 1557 and Portuguese sovereignty was finally recognized in 1887. Macao has never been an important trading port; the shallow bay on which it stands is accessible only to small craft. The Portuguese have intermarried extensively with the Chinese and produced almost a distinct race.

Hong Kong is separately described.

**The Plateaus of South China.**<sup>1</sup> The Si Kiang Valley and the south-east coast of China are cut off from the Yangtze Basins by a series of rugged, largely deforested mountains which broaden in some parts to form plateaus. Practically the whole of the province of Kweichow is occupied by such a plateau: it is continuous with, but distinct from, the Yunnan Plateau to the west and is also distinct from the basins to the north and south. Kweichow, like Yunnan, has numerous high plains surrounded by amphitheatres of mountains, and each has been made the seat of the capital of one of the thirty-three counties into which the province is divided—wherein a comparison with Shansi may be noted. Rice, maize and tobacco are the principal crops, together with opium. Nut-galls are collected from the oak forests and exported; the province is famous for its silk and is rich in minerals, though only silver and iron have been extensively worked. But Kweichow remains one of the least known and least accessible parts of China. The proportion of 'Miao', or aborigines, is large, but there is a steady immigration from overcrowded Szechwan.

## HONG KONG

Near the mouth of the Canton, or West River, about 90 miles south of Canton, lies the small island of Hong Kong, which has been a British possession since 1841. The island

<sup>1</sup> Some interesting details will be found in B. G. Toms, 'Notes on an Overland Journey from Chungking to Haiphong', *Geographical Journal*, Vol. LXII, 1923, pp. 117-132. See also S. Pollard, *In Unknown China* (London: Seeley Service, 1921); A. Hosie, *Three Years in Western China* (London: Philip, 1890).

(32 square miles) is separated from the mainland by a strait only about a mile wide, and on the shore of the mainland is Kowloon (3 square miles), part of the colony. In addition a considerable

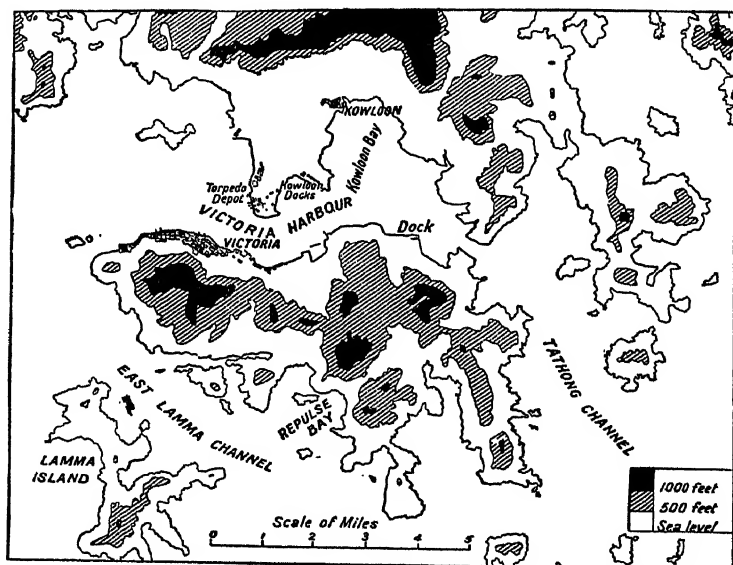


FIG. 277.—Hong Kong, showing the mountainous nature of the island and the situation of the magnificent harbour between the island and mainland.

piece of the mainland (c. 356 square miles) has been leased to Great Britain and is known as the 'New Territory'. The strait between the island and the mainland forms a magnificent harbour,

EXPORTS									
1931 - 34									
FOODSTUFFS	TREASURE	PIECE GOODS	OILS & FATS	METALS	CHINA MEDICINE	PAPER	BAGS	MANURES	VARIOUS
100	20	30	40	50	60	70	80	90	100
FOODSTUFFS	PIECE GOODS	TREASURE	OILS & FATS	METALS	CHINA MEDICINE	PAPER	BAGS	MANURES	VARIOUS
100	20	30	40	50	60	70	80	90	100
IMPORTS									

FIG. 278.—The foreign trade of Hong Kong.

and Hong Kong is visited by 30,000 vessels yearly. The wharves for ocean-going vessels, such as those at which the great Canadian Pacific liners berth, are on the Kowloon side, but the town of Hong Kong—officially known as Victoria—with wharves for river and coasting steamers, is built on the northern slopes of the lofty, rocky island. Land is precious and large reclamation

works are in progress. The business quarter hugs the shore, the principal Chinese quarter clings to the lower slopes further west, long flights of steps in some places replacing roads, while the dwellings of Europeans are scattered over the slopes of the Peak and elsewhere. The ascent to the Peak is facilitated by a funicular railway. From the hotel at the top there are few more fascinating sights than the crowded harbour, whilst no one is ever likely to forget steaming out of Hong Kong harbour by night and watching the twinkling lights which cover the whole face of the Peak.

Hong Kong is a free port ; there are no Customs dues and much of the trade of South China passes through Hong Kong. The trade is as large, for example, as that of the whole of the Union of South Africa ; it was valued at over £150,000,000 in 1923, or £85,000,000 in 1925, the drop being due to conditions in China. The years 1928 to 1933 show a decreasing trade and it is difficult to say how far this is due to the world depression and how far to an increase of direct trade with China, following on stabilization of the Government there. Previously not only has the stability of British Government attracted a very large trade, but the rich Chinese merchants and small shopkeepers alike appreciate its advantages, and no less than 723,000 Chinese live on the island or in Kowloon, although the total area of the colony proper is only 35 square miles<sup>1</sup> (1931). The non-Chinese population numbers 19,400. Hong Kong also has some of the largest shipbuilding and ship-repairing yards in the British Empire outside the British Isles, huge godowns or warehouses, sugar factories, rope and tobacco factories, cement works and tin refineries.

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<sup>1</sup> The New Territory, about 356 square miles, has 98,000 inhabitants, almost exclusively Chinese. There is constant movement of population between Hong Kong and South China : not a few Chinese are attracted by facilities for school and University education.

## CHAPTER VIII

### MANCHURIA

**H**istorical Introduction. The land to the north-east of China proper has long been known to Europeans as Manchuria—the land of the Manchus. The Manchus were nomadic tribesmen, allied to the Tungus, and were numbered amongst the raiders who periodically harassed the settled peoples of Northern China. It was as a protection against such raids that Chao Hsing, about 244 B.C., commenced the building of that barrier, completed during the Ming Dynasty, universally famous as the Great Wall and which extends for 2,000 miles from eastern Turkistan to northern Chihli, reaching the sea at Shanhaikwan. In time the Manchus of the plains acquired the arts of cultivation and developed a marked cultural life of their own, though they retained their virility, their superb horsemanship and their military organization. The invasion of China by the Manchus in the seventeenth century took place at a time when the Chinese were wasted and weakened by the struggle of warfare and the once powerful Ming Dynasty (1368 to 1644) had suffered from the successive Mongol incursions (see p. 504). The virile Manchus provided just the stimulus that China needed at the time. 'Flushed with victory and with long-desired power over her southern neighbour, Manchuria determined to mark the whole empire with her personality. The arts were encouraged and special schools for research were established. The Manchus were fully alive to the necessity for continuing Chinese customs and a form of government which, by long usage, had become not merely palatable but sacrosanct to the Chinese.' From the advent of the Manchu Dynasty in 1644 the Manchu tribesmen formed a sort of hereditary militia and penetrated to all parts of China. By intermarriage the erstwhile conquerors became absorbed physically and culturally among the Chinese and acquired Chinese culture in the place of their old fishing and hunting habits. Thus the Manchus in China no longer exist. For long Manchuria was the recruiting ground for the garrisons with which the Dynasty held China and Chinese immigration was strictly forbidden. In 1776 this prohibition was relaxed as far as the southern part of Manchuria was concerned. The



ense agricultural population of Northern China began to filter into the Manchurian plain—a land never very densely peopled and whose population had been greatly depleted by the continual drain of men to China. The Chinese immigrant farmers were mainly men who intermarried with the Manchu women. Thus in Manchuria also, the Chinese absorbed the Manchus, and if to-day there are any Manchus left it is in the extreme north where soldier colonies were long ago planted on the Amur River frontier. By the end of the nineteenth century the population of Manchuria was estimated at 14,000,000—more than 90 per cent. Chinese—but it was not until the Imperial Edict of 1907 that Manchuria was formally recognized as part of China. Thus the viceroyalty of the 'Three Eastern Provinces' (as Manchuria then became known) under a Chinese Governor-General was only established four years before the fall of the Manchu Dynasty and the establishment of the Republic.

In the meantime several foreign powers had become interested in Manchuria. The Russian penetration of Siberia—originally attracted by the fur trade—had proceeded as far as Tobolsk by the fourteenth century and in the succeeding centuries was pushed steadily westwards. In 1852 a Russian military expedition explored the Amur, and by 1857 Cossacks and peasants were established all along the river. This fact was recognized by China in 1857 (in 1860 by a treaty). For Czarist Russia, Manchuria was to be the eastern outpost of her empire and the eastern terminus of the Trans-Siberian Railway (begun in 1891) which was to bind that empire together. But Japan, with an overflowing population and with only limited resources, had a more vital interest than Russia in Manchuria. As the southern key to Manchuria interest centred on the Liaotung Peninsula. Japan demanded the peninsula as the prize of her victory in the Sino-Japanese war of 1894–5, but Russia, backed by France and Germany, forced her to abandon this claim to the peninsula, which, commanding the seaward approach to Peking, has been described as a 'veritable pistol pointed at the head of China'. But three years later (1898) Russia secured a lease of Kwantung at the tip of the peninsula with the naval station of Port Arthur and what has since become the great port of Dairen. After her victory in the Russo-Japanese War of 1904–5, Japan secured this lease as well as the right to construct railways in Southern Manchuria—to be vested in the South Manchuria Railway Company. Even before the war of 1904–5 Russia had built the Chinese Eastern Railway across Northern Manchuria—a short cut to Vladivostok—and was pushing railway construction towards Port Arthur, especially

important because Vladivostok is ice-bound in winter. Although neither the South Manchuria Railway nor the Chinese Eastern Railway are nominally government concerns, the Japanese Government appoints the officials of the South Manchuria Railway from amongst the shareholders (which must be either Japanese or Chinese citizens). Investment in the Chinese Eastern Railway was restricted to Russians and Chinese, so that in effect Southern Manchuria became a Japanese 'sphere of influence' and Northern Manchuria a Russian sphere. The famous 'Twenty-one Demands' presented to China by Japan in 1915 confirmed 'the predominant position of Japan in South Manchuria and Eastern (Inner) Mongolia'.

During the Chinese Civil War, which broke out about 1922, Japan continued to exercise a controlling influence, and the presence of Japanese troops in the railway zone was the chief factor in the maintenance of peace in the country. As the Chinese National Government at Nanking grew in stability, it sought to re-establish Chinese authority over Manchuria, but on September 18th, 1931, a Japanese army occupied Mukden. Military operations followed, and in February, 1932, the 'Three Eastern Provinces' (Fengtien, Kirin and Heilungchiang), together with Jehol, were, with the assistance of Japan, proclaimed an independent state under the title of 'Manchukuo', with a capital at Hsinking (Chang-chun). The League of Nations sent a commission of inquiry under the chairmanship of Lord Lytton in 1932, and the Lytton Report favoured the claims of China. Japan recognized the State of Manchukuo six months after its formation, but, apart from an understanding with Russia, no other Power has done so. Japan has, however, continued the policy of developing Manchukuo. In January, 1933, it was decided to make Henry Pu (the Chief Executive and scion of the old Imperial Manchu house) hereditary Emperor. He was crowned on March 1st, 1934. During 1933 and 1934 the boundaries of Manchukuo were extended westwards so as to include 'outer' Mongolia and southwards to the Great Wall. The actual position is thus that the new state is completely under the dominance of Japan. Early in 1935 Japan completed the purchase of the Chinese Eastern Railway from Russia, thus eliminating the old Russian sphere of influence in the north. The description which follows will refer to the present boundaries of the country.

**Position and Area.** According to the Japan-Manchukuo Year Book, 1935, the state lies between lat.  $38^{\circ} 43'$  and  $53^{\circ} 50'$  North and long.  $115^{\circ} 20'$  and  $135^{\circ} 20'$  East, being bounded naturally on the north by the Amur River; on the east by the

aritime Province of Siberia and by Korea; on the west by Outer Mongolia and China proper (to the line of the Great Wall). On December 1st, 1934, Manchukuo was divided into fourteen provinces, having previously comprised the five provinces of Fengtien, Kirin, Heilungkiang, Jehol and Hsingan besides the Kwantung Leased Territory and the South Manchuria Railway zone. The total area is 1,304,214 square kilometres (503,427 square miles), or twice the size of Texas and more than the combined areas of France, Germany and the British Isles. Out of this total Kwantung accounts for only 3,462 square kilometres and the railway zone 290. Manchuria corresponds in latitude to the region around the mouth of the St. Lawrence and the north-eastern United States—from Washington to Labrador or the south part of Hudson Bay. Like the North American region, Manchuria has a marked 'East Coast' climate, but rendered more extreme by the greater land mass of Asia, the influence of Mongolia and the topographical isolation from the Pacific Ocean.

**Physical Features.** Physically, Manchuria consists of three parts. There is a great central plain, narrow in the south, where it is drained by the lower course of the Liao Ho and by the Hun Ho; broad in the north, where it stretches from the Hsingan scarps on the west to the forested mountains of Eastern Manchuria on the east. This broad northern region is drained by the tributaries of the Sungari, which itself flows into the Amur. The mountains of Eastern Mongolia are prolonged southwards into the Liaotung Peninsula. The greater part of Northern Manchuria is a complex of wooded hills and mountains, including the Little Khingan.

It is possible to distinguish, within the present boundaries of the country, seven natural regions—primarily physical regions, but in which physiography is reflected in all phases of human activity. These regions are:

- (1) The forested eastern mountains, south of the Sungari Valley. The forests consist mainly of oak, ash, walnut, poplar, spruce, fir, pine and larch, and are largely untouched except near the railways.
- (2) The Liaotung Peninsula, which is physically a continuation of the last region towards the south-west and which is structurally allied to the Shantung Peninsula. Here are the great coal and iron ore resources of the country—the Fushun Coalfield worked 22 miles east of Mukden with the thickest seam of bituminous coal in the world (over 400 feet) and an output at present nearly equal to that of the whole of China proper.

- (3) The fertile central plains, naturally grass-covered, comprising the Liao Plain in the south and the Sungari Plain in the north. These plains are different in character from the North China Plain which is largely alluvial,

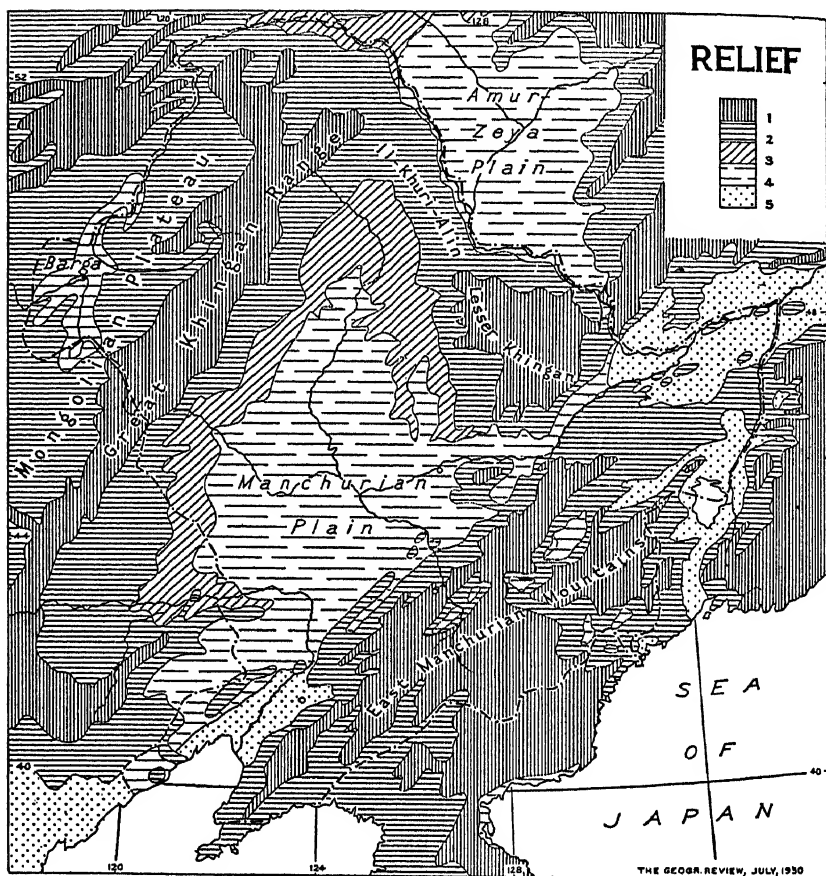


FIG. 279.—The Relief of Manchuria.

- 1 = Mountains.      2 = Uplands and higher foothills.      3 = Lower foothills.  
4 = Plains.      5 = Lowlands.

(After E. E. Ahnert.)

(Reproduced from the 'Geographical Review', published by the American Geographical Society of New York.)

whilst the Manchurian Plain is a plain resulting from long-continued denudation and so has a more irregular surface.

- (4) The Khingan mountains—the forested mountains of the north and west. In the forests the principal trees are

fir, larch, aspen, elm, oak, birch and pine, with spruce to the south.

- (5) The mountains of Jehol, stretching south-westwards to the Great Wall.

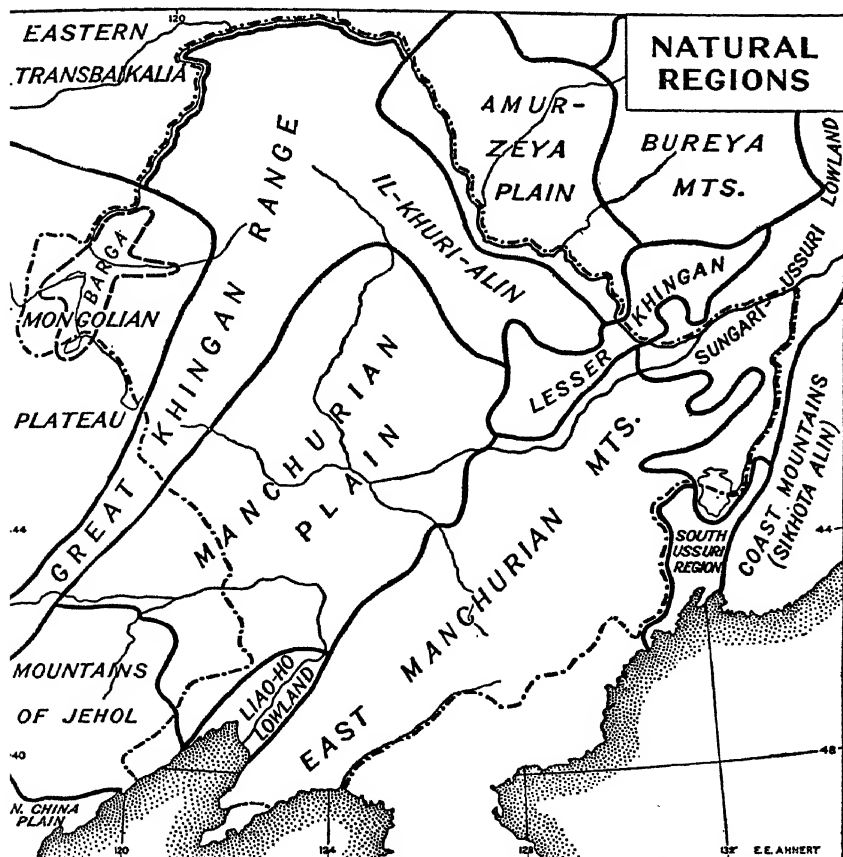


FIG. 280.—The geographical regions of Manchuria, according to E. E. Ahnert.

- (6) The Mongolian Steppelands occupy that part of the country beyond the Khingan mountains.

- (7) The narrow Amur Valley occupies the extreme north.

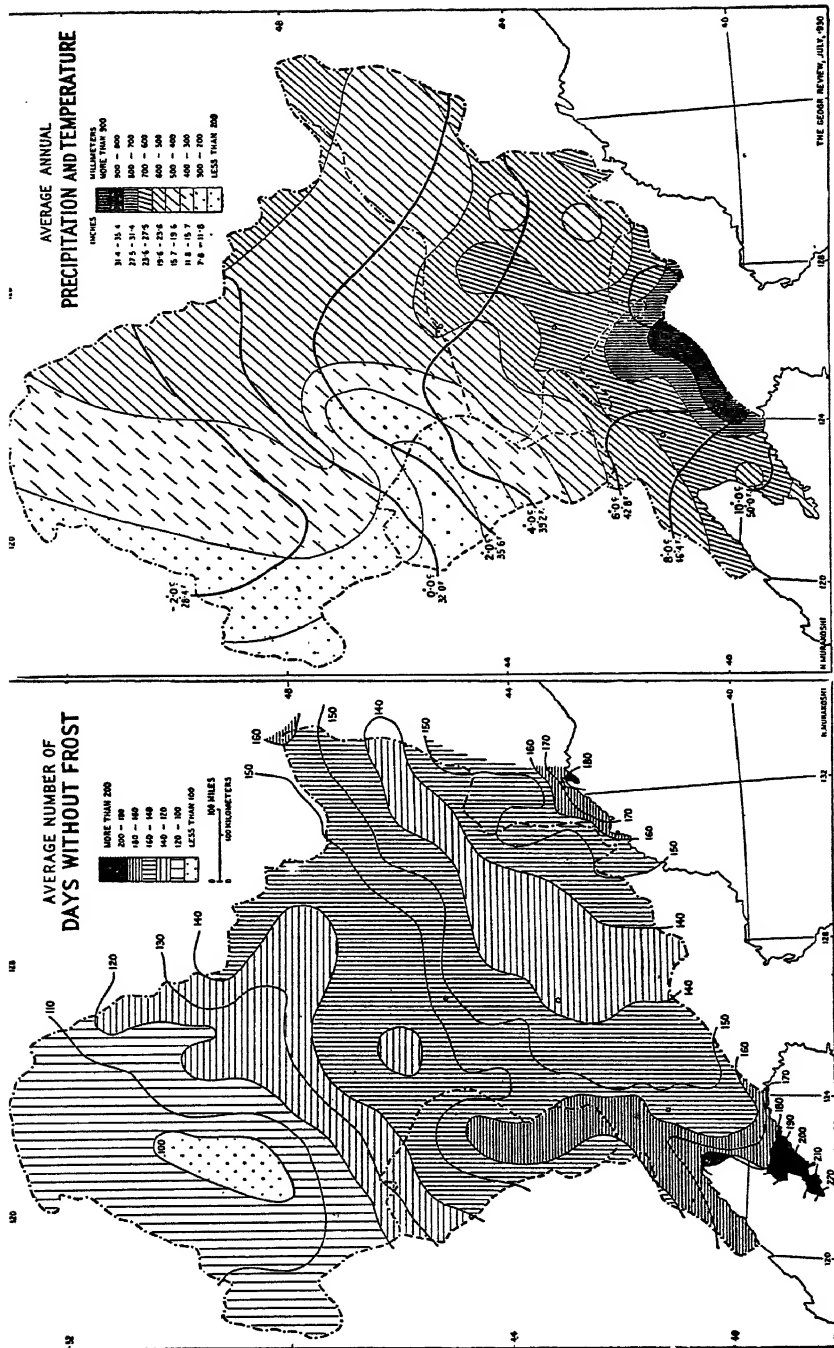
**Minerals.** Before the introduction of foreign capital for development work, alluvial gold was the only mineral extensively mined. The alluvial gold appears to have come from widely disseminated gold-bearing gneisses. For centuries the alluvials

of small streams have been panned, but much metal still remains in deposits actually already worked over. The most extensive deposits lie in the tributaries of the Yalu and the Upper Sungari and amongst the Valleys of Heilungkiang. Manchuria has large coalfields, and although coal was worked by Koreans and Chinese probably as early as the fourteenth century, modern coal-mining was inaugurated by the Russians and has flourished since the Japanese took over the principal collieries with the South Manchuria Railway. These are the Fushun coal-mines, 22 miles south-east of Mukden. The field occupies the Valley of the Yingpan and in an area 10 miles by 2 is estimated to have reserves of 1,200,000,000 tons of bituminous coal. The seams include some of the thickest in the world. In 1907-8, immediately after the taking over of the mines by the South Manchuria Railway Company, the production was under 200,000 tons; it increased almost steadily (except for 1914-15 and 1915-16) to 3,700,000 tons in 1919-20 and 5,540,000 tons in 1924-25, since when still higher figures have been reached, being about 8,000,000 tons in 1934. There has been a steady increase in the amount of coal consumed in Manchuria, in addition to a steady export trade. Another field operated by the Railway is Yentai, of which the production first reached 100,000 tons a year in 1923-24. Other mines independently owned are Hsintai and Penhsihu. The total output of coal from Manchuria first exceeded 10,000,000 tons in 1930 (Fushun and Yentai mines), though dropping somewhat owing to the general depression in later years.

Next to coal, iron is the most important mineral product of Manchuria. There are said to be numerous hæmatite-bearing veins in the metamorphic rocks of the country, some of which have been worked by native methods on a small scale. But interest centres on the mines of Penhsihu and Anshan. The latter was developed by the South Manchuria Railway in connection with the Anshan Iron and Steel Works, established in 1918 and reorganized as the Showa Steel Works in 1933. The total production of iron ore in Manchuria realized nearly a million tons in 1931 and 1932, and pig-iron production at Anshan and Penhsihu exceeded 430,000 tons in 1933.

Amongst other minerals may be mentioned salt, manufactured from sea-water along the coasts, which is a Government monopoly. Natural soda is obtained from the low plains of eastern Inner Mongolia.

**Climate.** In the south, on the shores of the Yellow Sea, the temperature of Dairen ranges from a January average of 23° F. to a July or August average of 76° F. Further north the winters are much colder, whilst in summer the temperatures



FIGS. 281 AND 282.—Climatic conditions in Manchuria.

are not quite so high. At Harbin the January average is below zero, the July 75°. As in Northern China, the winds of winter, and especially of spring, are not only very cold but very strong. Manchuria is still within the region of monsoon rainfall, hence the summer is the rainy season. But the total fall is small—Mukden has 26.5 inches, Harbin 19.7, and Tsitsihar only 10.2. On the whole the conditions in the central plain of Manchuria compare closely with those in the prairies of Canada. The climate is rigorous but healthy, conducive to more active work than in the more enervating plains of China, and one especially suited to cereal farming. But as in Canada agriculture is limited by two great sets of factors: (a) the length of the growing season, and (b) rainfall. Two maps have been reproduced from Nobuo Murakoshi and G. T. Trewartha's study.<sup>1</sup> One hundred and twenty days' growing season is ample for wheat, so that all Manchuria except the north-west lies within the area where wheat cultivation is possible, but aridity limits the area on the west.

**Vegetation and Soils.** The typical black chernozem does not occur in Manchuria, the organic matter being insufficient in quantity. But the content of valuable mineral salts is high; the main fault of the soils is that after rain they are so fine grained as to be somewhat heavy except in the more arid west where sandy soils are widespread. In this area, too, considerable tracts—probably 10 per cent. of the whole plain—are rendered unproductive by alkalinity.<sup>2</sup> In other areas poor drainage renders other large tracts unsuitable for cultivation. Away from the plains the soils are brown or yellow and in general thinner and poorer—as for example in the Liaotung Peninsula.

Speaking generally, the plains of Manchuria belong to the mid-latitude grasslands. As in all such grassland areas cultivation is rapidly eliminating all remnants of the natural vegetation. The mountainous borders are forested, with the thickest forests and the best timber on the eastern mountains. The most valuable timber is the Manchurian pine (*Pinus mandshurica*), often reaching 200 feet in height and 5 feet in diameter. Larches rank second in importance to the pines.

**Agricultural Development.** The most complete agricultural development of Manchuria has taken place in a belt from 100 to 150 miles wide stretching from the Gulf of Liaotung north-eastwards, as shown in Fig. 283.

In 1934 it was calculated that 35 per cent. of the southern province of Fengtien could be classed as arable, and of this

<sup>1</sup> *Geographical Review*, Vol. XX, 1930, pp. 480-93.

<sup>2</sup> The extraction of soda from these soils in the north is an old industry.



no less than 73 per cent. was actually under crops. In Heilungkiang 22 per cent. is classed as arable, of which 32 per cent. is already farmed. The north of Manchuria is thus the 'land of promise' and it is clear why immigration is now so largely to the north.

Out of a total of between 30,000,000 and 40,000,000 acres

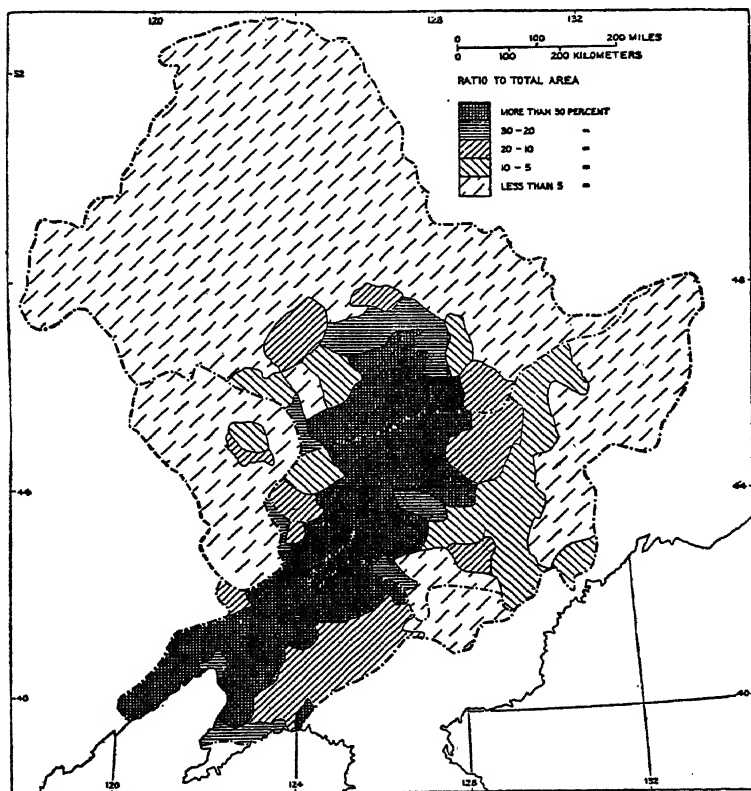


FIG. 283.—The proportion of cultivated land in Manchuria.  
(After Murakoshi and Trewartha.)

under cultivation the percentage occupied by the chief crops in 1934 was estimated as follows:

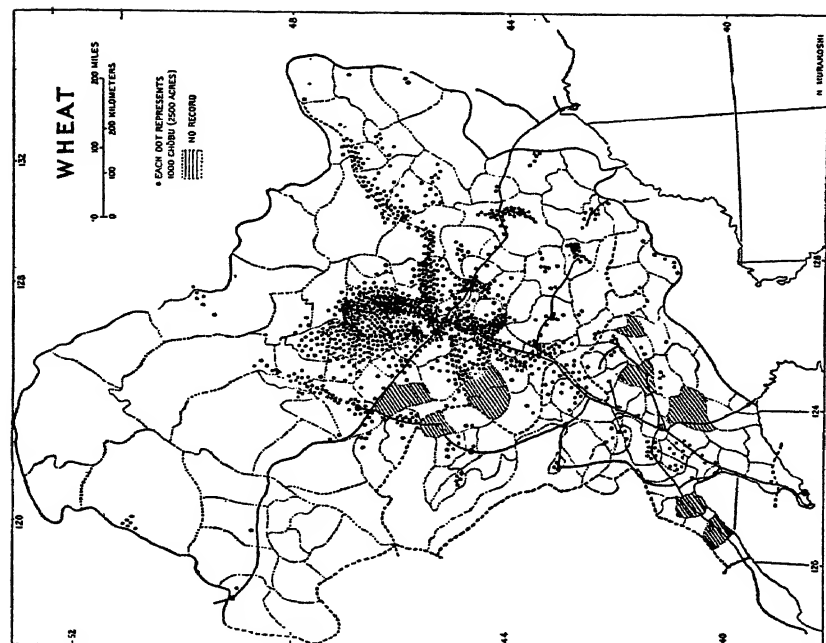
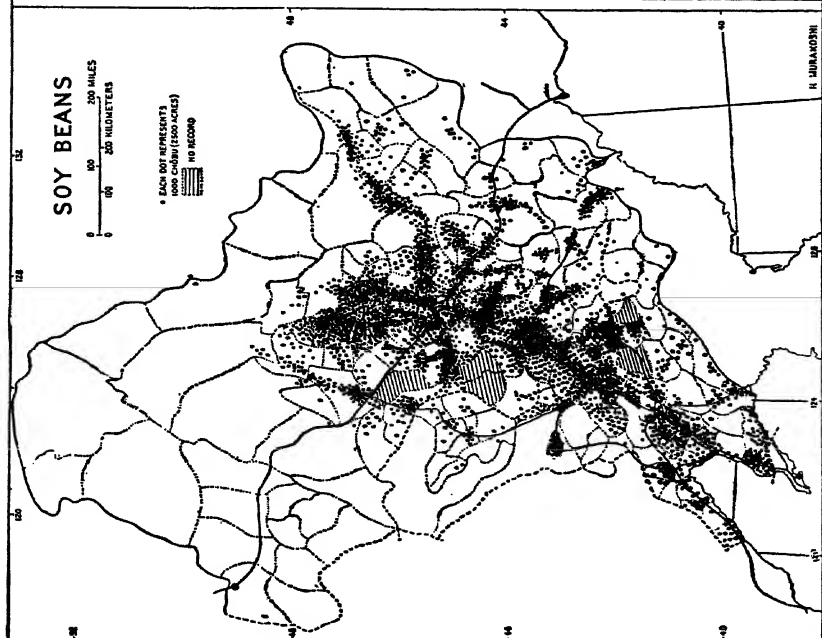
Soya beans . . . . .	28	Maize . . . . .	9
Other beans . . . . .	2	Wheat . . . . .	7
Kaoliang . . . . .	23	Rice . . . . .	2
Millet . . . . .	18	Others . . . . .	11

*Soya or Soy Beans.* Undoubtedly the outstanding crop of

Manchuria is the soya bean ; indeed, the rapid rise of this crop to one of importance in the world's commerce is one of the most remarkable agricultural developments of recent times. The plant itself is a valuable fodder plant and a natural manure—being a legume, the plant enriches rather than impoverishes the soil. The soya bean has been an important food in China for thousands of years, but it is only recently that America and Europe have come to appreciate the value of the beans and their oil. Actually the first shipment abroad of the beans—to England—was only made in 1908. The beans themselves may be used green as vegetables or canned ; the dried beans may be cooked in a variety of ways or used for the manufacture of soups, sauces, breakfast food and vegetable milk—it being possible to prepare a variety of cheeses, milks and casein from the milk. The bean oil can also be used in the manufacture of food products—butter substitutes, lard substitutes, salad oils, etc., but its main importance is in industry. It was during the Great War that huge quantities of soya-bean oil were imported into the United States to supply essential raw material for the manufacture of glycerine, explosives, soaps, paints, varnishes, celluloid and printing inks. The bean meal is valuable, not only as stock feed and fertilizer, but also for human consumption, being prepared as breakfast foods, diabetic foods, flour, etc. The expansion of the soya-bean industry must be accredited largely to the South Manchuria Railway ; the export is mainly through Dairen, the beans finding a market in China and Japan, the oil especially in America and Europe. Several hundred mills of all sizes and types exist in Southern Manchuria for crushing the beans and extracting the oil.

But it is difficult to predict the future of the soya-bean industry. The bean cannot grow without the existence of certain bacteria in the soil and so cannot immediately be cultivated in new areas. But soils are now 'inoculated' with the necessary bacterial culture and huge quantities of the bean are being grown, for example, in the American Middle West. There has been a sudden drop in the demand for the Manchurian commodity. From 1933 to 1934—in one year only—there was a drop in acreage of over 1,000,000 and production fell from 4·6 million tons to 3·84.

*Kaoliang.* Kaoliang is the staple food of the native population and of the animals engaged in farm work and transport, and, prior to the extension of bean cultivation, was the leading crop and occupied half the cropped land. It requires a growing season of at least 150 frost-free days and so becomes of small importance northwards. A strong, colourless spirit is prepared



from the grain; the stalks find a use as a roofing material, in the manufacture of matting and as fuel.

*Millet.* Italian and Common Millet rank next to Kaoliang as human food, whilst the straw is universally used as fodder. It is to the people of northern Manchuria what Kaoliang is in the south.

*Wheat.* Wheat ranks fourth or fifth among the crops and

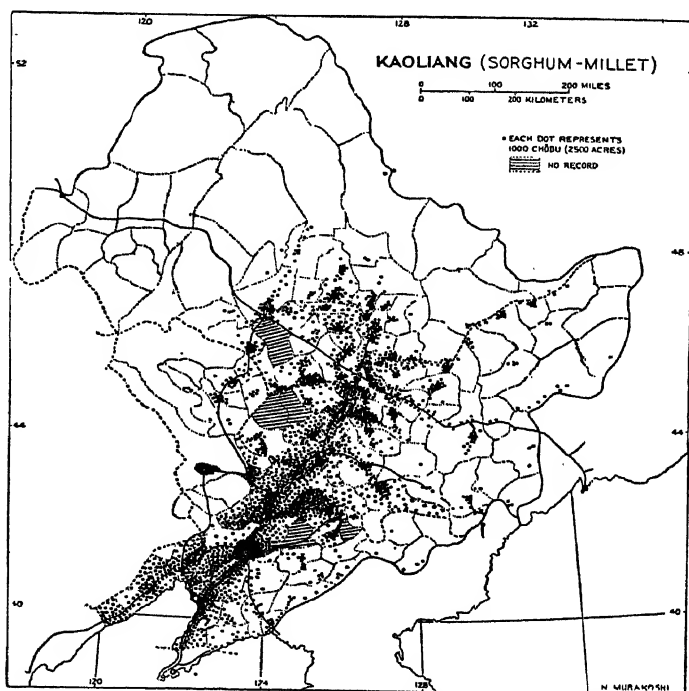


FIG. 286.—The distribution of kaoliang in Manchuria.

is a great crop of the northern part of the plains, whereas *maize* (which vies with it in importance) is of greatest importance in the south. The wide open plains of Manchuria are suitable for American methods of agriculture, and the modern outlook of the railway has done much to foster the adoption of these methods. Manchuria has thus the power to become a leading wheat grower and exporter: though long cultivated, wheat has only recently entered the world's markets from Manchuria.

*Rice.* The Chinese of Manchuria are neither rice growers nor rice eaters. That which is grown is more than half upland

hill rice; it is produced by Korean immigrants and sold largely to Japanese.

*Other Crops.* Work has not been restricted merely to opening up new areas; much has been done to improve existing crops—especially to increase the oil content of the soya bean—to teach better cultural methods to the farmers and to introduce new crops. In particular, arboricultural work is notable; a country formerly barren of trees is now dotted by large orchards of apples and other fruits all over the south, whilst willows and Chinese poplars have been widely planted in the north.

Barley has been cultivated mainly since the Russo-Japanese War, when it was required as food for the horses of the Japanese army. Buckwheat, hemp, tobacco, cotton, sugar beet and fruit are other important crops.

It is difficult to assess the importance of opium.<sup>1</sup> In November, 1932, a State opium monopoly was created with the avowed intention of gradually eliminating its use. The areas in which the poppy may be cultivated are fixed and lie almost entirely in Jehol and north-eastern Kirin. For the year 1934–35 the area was fixed at 114,000 acres, an acre yielding about 10 lb. of opium. But much illicit growing is carried on and the lucrative nature of the monopoly may cause the suppression of the drug to be long delayed.

The cultivation of cotton is to be encouraged. Twenty-five thousand lb. of indifferent quality are produced: the estimated requirement is 200,000,000 lb.

*Sericulture.* Much attention has been directed in recent years both to the rearing of 'wild' silk-worms (for tussore silk) and to the introduction of sericulture as a side-line in general farming. At present production of silk is largely restricted to Kwantung.

*Pastoral Farming and Stock Rearing.* As in most of the world's grasslands, stock raising preceded agriculture in Manchuria and was the principal occupation of the Manchus, though they do not seem to have used milk. Pigs, cattle, horses, sheep, monkeys and mules are all numerous, being kept by the Chinese as farm animals. The horses are almost entirely of Mongolian breeds, small but sturdy.

**The Populating of Manchuria.** In the absence of a national census an accurate figure for the population of Manchuria is not available. Excluding the leased territory and the railway zone at the beginning of 1934, the population was estimated to be 30,880,000, with an average of 6·1 persons per family and 122 men to 100 women. Of this total 30,190,500

<sup>1</sup> See *The Times*, March 8th, 1935.

are Chinese, 590,760 Japanese and 98,431 other nationals (mainly Russians). The population of Kwantung and the railway zone was, in addition, 1,408,755, of which 309,029 were Japanese and 2,185 'other nationals'. It would seem that the figures for Chinese (described as Manchus officially) include the 680,000 immigrant Koreans.

About 80 per cent. of the inhabitants of Manchuria can be described as 'rural'; the chief cities are Hsinking (formerly Chang-chun), the capital, 126,000; Harbin, 405,000; Mukden, 339,000; Kirin, 119,000; Tsitsihar, 75,000; Yingkow, 119,000; and Antung, 92,000. In the leased territory Dairen (the former Dalny of the Russians) boasts 400,000 inhabitants. One of the most remarkable cities of Manchuria is Harbin—at the beginning of the present century it scarcely existed and its spectacular rise was mainly due to Russian enterprise. Side by side with a thoroughly modern western city, at one time boasting the largest white population of any city in Asia (over 100,000 Russians), and still having 50,000 Russians, has grown an old-style Chinese town. But Dairen can claim to be as remarkable in its way as Harbin. It is as much Japanese as Harbin is Russian and in its expanding wealth of fine modern buildings far surpasses the northern city.

From the figures given above it will be seen that the population of Manchuria has increased by about 18,000,000 since the beginning of the century. The flood of immigration started early in the present century and reached a peak in 1927, when over a million persons came into the country. The overwhelming majority of the immigrants are Chinese from North China, especially Shantung. In part the migration is seasonal, the immigrants returning to their homes in North China every winter after the harvest.<sup>1</sup> But in every year from 1924 to 1930 the net gain was over a quarter of a million annually, reaching 836,000 in 1927. Recently it has dropped greatly—whether the new régime in Manchuria or the pacification of China is primarily responsible it is difficult to say. The idea formerly entertained of settling large numbers of Japanese in Manchuria has not matured. Most of the Japanese live in or near the towns and the railway zone: they live very much to themselves and take kindly neither to the rigorous climate nor to the life of exile. Both amongst the Japanese and Chinese men largely outnumber the women. The immigrants do not bring their womenfolk until they have established themselves in the new land. The

<sup>1</sup> This was typical of the 'old' migration from Shantung rather than of recent migration. See Owen Lattimore, 'Chinese Colonization in Manchuria', *Geog. Review*, Vol. XXII, 1932, pp. 179-95.

Chinese immigrants arrive by railway, by sea, as well as in vast numbers on foot. The number of Korean immigrants is noteworthy. Korea is a very densely populated country and the cause of the migration is primarily economic. Although the Koreans are Japanese subjects, the immigrants must not be regarded as an 'advance guard' of Japanese colonization. Actually Koreans were amongst the early inhabitants of what is now Manchuria. The Korean immigrants are essentially rice-cultivators.<sup>1</sup>

**Communications.** The railway has played, and is playing, a remarkable part in the development of Manchuria. The three chief systems were the Chinese Eastern in the north, the South Manchuria in the south-east, and the Peiping-Liaoning (Peking-Mukden) in the south-west—representing Russian, Japanese and Chinese influence respectively. With the purchase of the Chinese Eastern in 1935, the South Manchuria is left with practically the whole of Manchuria as its sphere—as long ago as 1917 the whole of the Korean system was put under its management.

The part which the South Manchuria Railway has played, and is playing, in the development of Manchuria may be likened to the part played by the Canadian Pacific in the opening up of Canada. Like the Canadian Pacific, the South Manchuria Railway is far more than merely a railway company. Taking the position in 1931, only 27 per cent. of its capital expenditure has been on railways; 11 per cent. being for mines (Fushun coal-mines and iron-mines), 3 per cent. for steel works (Anshan), 8 per cent. for harbours, its other activities including land, buildings, local institutions, hospitals, schools, hotels, steamships, electricity, gas and other industries and workshops, research bureaus for agriculture, minerals, public health and civic planning. The total capital of the company is 440,000,000 yen (£44,000,000 roughly), half of which is held by the Japanese Government, the other half by Japanese and Chinese investors—but mainly Japanese. The South Manchuria Railway Company shows the very big stake which Japan has in Manchuria and affords an explanation which a study of population figures does not. The official total of Japanese investments in Manchuria was given in 1931 as 1,715,800,000 yen or £171,580,000. Since the inauguration of Manchukuo, railway construction has been pushed on with great rapidity. There were nearly 4,000 miles in operation at the end of 1934, more than half being classed as 'State lines'; 700 miles South Manchuria Railway and 1,100 as North Man-

<sup>1</sup> Hoon K. Lee, 'Korean Migrants in Manchuria', *Geog. Review*, Vol. XXII, 1932, pp. 196-204.

churia Railway (formerly Chinese Eastern). The railways in operation are shown in Fig. 287.

A great scheme for the construction of 37,000 miles of roads in 10 years was put into operation in March, 1932, and the mileage completed in the first two years was 4,500. The main purpose of the roadways is to encourage bus services.

Already the normal means of travel for many purposes is

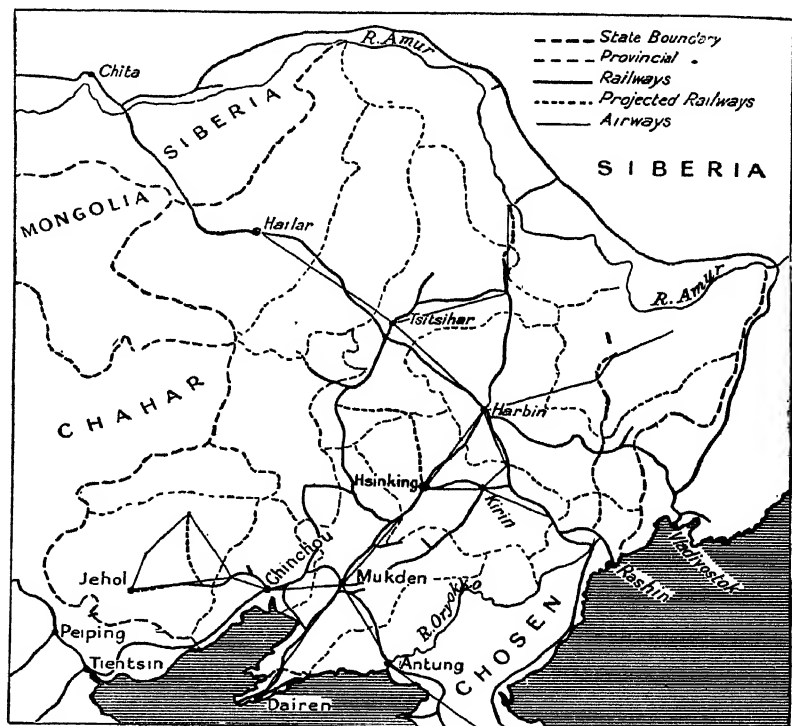


FIG. 287.—The communications of Manchuria, January, 1935.

by air. The airlines and airports in operation in 1934 are shown in Fig. 287.

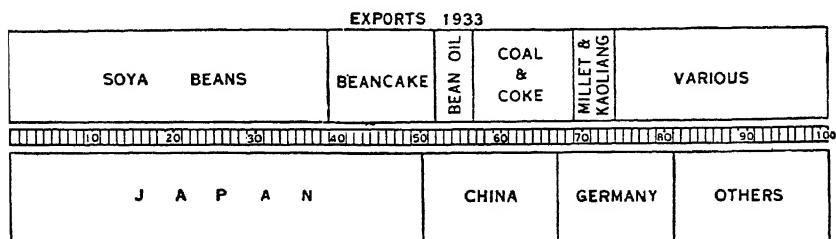
Extensive use is made of navigable waterways—regular cargo services are operated on the Sungari, Amur, Liao, Non and Yalu, though climate limits navigation to 7 months of the year or less.

*Port Arthur* is the only ice-free port of Manchuria. After long use as a naval base, it is now open to commerce, but is not very greatly used. *Dairen* is the great port for the whole



country—especially for the staple exports of the country. The port is under the control of the railway and in traffic ranks second only to Shanghai on the eastern coast of Continental Asia. The port is located near the south-west point of the peninsula, the mouth of the naturally protected harbour opening to the south-east. *Antung*, the third port of Manchuria, lies on the Yalu River—which is blocked by ice for four months of the year—more—25 miles from its mouth. It is limited to vessels of under 800 tons.

**Industries and Trade.** The ushering in of a new industrial era in Manchuria is mainly the result of Japanese initiative. At present bean-oil milling, flour milling and the preparation of tobacco take the leading place. Other industries are in their early stages, but cotton textiles are already significant. Anshan has been created by the iron and steel industry, Fushun by the



DIRECTION OF EXPORTS 1933

FIG. 288.—The foreign trade of Manchuria.

collieries, Shakakon by railway workshops. The distilling of kaoliang liquor and the brewing of saké and beer are other important industries, and a wide variety of minor industries has been established.

The foreign trade of Manchuria was previously measured in taikwan taels, but in June, 1932, the Manchukuo yuan—a silver unit of 23.91 grains of pure silver—was introduced. This unit was worth about 30 U.S. cents or 1s. 3d. sterling. It is difficult to generalize about the foreign trade of Manchuria. Until 1933 exports normally exceeded imports. Of the exports one-half to two-thirds are formed by soya beans, bean cake and bean oil. Coal represented 10 per cent.; iron is important; minor exports include various agricultural products—pigs, millet, kaoliang, ground-nuts, etc. The imports include cotton piece-goods, followed somewhat surprisingly by wheat flour in recent years and by the wide range of raw materials and manufactured goods required by a rapidly developing country. The bulk of the trade is with Japan and China; that with Russia has been

decreasing. From 1929 onwards there was a large drop in the United States purchases of beans, but fortunately in 1932 Germany first appears as a large purchaser.

#### REFERENCES

G. B. Cressey's *China's Geographic Foundations* (McGraw Hill, 1934) includes excellent chapters on Manchuria. There are numerous publications on Manchuria issued from Japanese sources which naturally stress the Japanese viewpoint. Amongst these the *Japan-Manchoukuo Year Book* is an invaluable source of material which may be supplemented from older sources such as the Report on *Progress in Manchuria, 1907-28* (South Manchuria Railway Company, 1929). Much use has been made in the foregoing account of an important series of crop maps by N. Murakoshi and G. T. Trewartha in the *Geographical Review*, Vol. XX, 1930, pp. 480-93. See also *The Pioneer Fringe* (various authors), American Geographical Society; Owen Lattimore: *The Mongols of Manchuria* (London, 1935).

## CHAPTER IX

# THE DEAD HEART OF ASIA

### PART I. TIBET

THE mysterious land of Tibet has long appealed to all classes of mankind. Its inaccessibility and the exclusiveness of its inhabitants have proved in a high degree attractive to explorers; the rivers which take their rise within its mountain fastnesses have become the sacred rivers of Hinduism; it is also the site of many of the most sacred shrines of Buddhism.

Tibet consists essentially of a huge stretch of upland plains, lying at a height of more than 12,000 feet above sea-level, surrounded by walls of mountains rising to even greater heights and situated between 27° N. and 37° N. and 78° E. and 103° E. The boundaries are, in many cases, ill defined as, for example, in Bhutan, where the junction between the pine forests and bamboo forests marks the limit between the Tibetans' grazing land and the Bhutanese territory. Geographically and ethnographically North-eastern Kashmir—the province of Ladakh—is part of Tibet. Sikkim was originally under Tibetan rule, and so was the British district of Darjeeling. The whole area is between 700,000 and 800,000 square miles, with a population estimated at 4,000,000 or 5,000,000, the majority of whom live in the districts between Lhasa and the Chinese border. The western half of Tibet supports a density of population of only about 1, for even the plains and valleys, lying at over 15,000 feet above sea-level, are too elevated for crops to ripen. The slope of the country is in general towards the east, and parts of the eastern and south-eastern districts descend in places to below 5,000 feet, making possible the cultivation of barley, wheat and peas (the staple crops of Central Tibet), as well as maize and occasionally even rice.

Tibet may be divided into four great physical regions:

(1) The Northern Plains (Chang Tang) form a tangled mass of plains and valleys, with an elevation averaging more than 16,000 feet and rising several thousand feet higher in its mountain

peaks and ridges. The region is bounded on the north by the Kunlun and the steppes of Tsaidam and stretches as far south as the valley of the Tsangpo. The Chang Tang is studded with lakes of varying size, sometimes in groups, fed by waters from the surrounding mountains and valleys, but with no outlets. The streams provide fresh water; the lakes are salt. Many of these lakes have an area of more than 100 square miles; Tengri Nor is more than 1,000. The plains are treeless because of the elevation; the vegetation consists of scanty grass, but sufficient to support large numbers of wild yaks, asses, sheep, goats and other animals, as well as the herds of yaks and sheep tended by nomads. A few radishes and potatoes can be grown, but no grain, so that food for the herdsmen has to be brought from more favoured parts. As a result this vast stretch of country, 1,500 miles from east to west and 400 or 500 broad, is almost uninhabited and forms one of the main barriers of Central Asia.

(2) Southern Tibet consists of the valleys of the Upper Indus and Sutlej in the west and the great valley of the Tsangpo—the Brahmaputra of India—in the south and east. The three rivers all rise in the same region, near the sacred lake of Manasarowar. For 400 miles of its course on the plateau (from Lhatse to below Tsetang) the Tsangpo, though flowing at an elevation of 12,000 feet above sea-level, is navigable. The Tibetan craft is a coracle, made from the hides of yaks and other cattle stretched over a framework, generally of willow. The loads possible are amazing—a whole Tibetan family with the family donkey. This country is Tibet proper—known to the people as Pö (in contrast to the Chang Tang on the north)—and here are found the chief towns—Lhasa, Shigatse and Gyantse; it includes the seat of the Dalai Lama and his government.

(3) Eastern Tibet comprises the mountains and valleys lying between the Chang Tang and the Chinese frontier. On the eastern slopes of the Chang Tang rise the great rivers of South-eastern Asia—the Salween, Mekong and Yangtze; a little to the north the Hwang Ho. The three first mentioned flow through Eastern Tibet and leave by the three famous parallel gorges only a couple of dozen miles from one another. Eastern Tibet is partly under the sway of Lhasa, partly under the influence of China and is divided into a number of States very different from one another. Eastern Tibet is a land of considerable natural resources—grazing is abundant, there are extensive forests, agriculture is possible on a large scale, and there is known to be considerable mineral wealth.

(4) The great Tsaidam Basin with the Tsaidam swamp and

the Koko Nor Basin to the north-east may be regarded as a fourth region of Tibet.

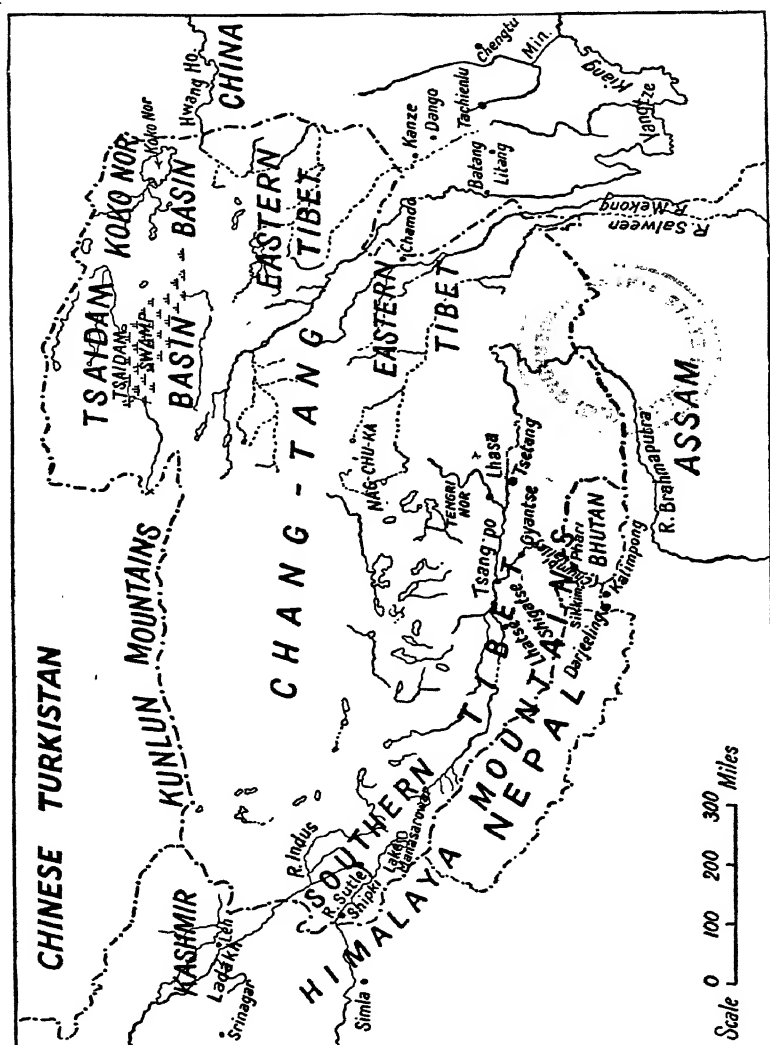


FIG. 289. —Tibet.

The climate of Tibet is exceptionally severe, the natural severity due to elevation being accentuated by the violent biting winds

which blow during the greater part of the year, especially about midday and in the early afternoon. In the wide, open spaces of Tibet there is nothing to break their force, and travellers in autumn and winter prefer to brave the keen frosts of early morning than the winds of later in the day. In the lower lands, such as the Chumbi Valley, below 12,000 feet, the climate is dry, bracing, agreeable and healthy and the air extraordinarily clear. Amongst the effects associated with the rarity of the atmosphere at great elevations are the differences between sun and shade temperatures. Rocks in the sun are often too hot to touch, whilst it may be freezing in the shade. The great height of the snow-line—20,000 feet in Central Tibet, compared with 17,000 feet on the Himalayas in Sikkim—is due to the greater dryness of the atmosphere. Sikkim and Darjeeling have an annual precipitation of 80 to 250 inches, but Gyantse, though only between fifty and a hundred miles to the north, has an average annual fall of about 8 inches, whilst a fall of 12 inches during an exceptional year was sufficient to cause extensive flood damage. To the north the fall increases; Lhasa has 14 inches, sixty miles further north it is probably 18 or 20 inches.

The Tibetans are keen traders, and the country is well supplied with trade routes; the more important trading posts are shown in Fig. 282. There is the Srinagar-Leh-Shigatse-Lhasa road, which is joined at Leh by the 'Hindustan-Tibet' road via Simla.<sup>1</sup> But the most important route from India is from Kalimpong (Darjeeling district) across the Dzelep La via the Chumbi Valley to Phari and thence by two routes to Lhasa. Another route is from Assam via Tsetang to Lhasa. From Lhasa a great route strikes north past Nagchuka and the Chang Tang, eventually reaching Urga. From Lhasa a well-used route goes to Chamdo, whence there are two routes to Tachienlu; the southern via Batang and Litang, the northern via Kanze and Dango. Tachienlu is on the ethnographic frontier between Tibet and China and the chief entrepôt of trade. Here the wool of Tibetan sheep is exchanged for the tea of China, which the Tibetans prefer to Indian tea. Twice a year also caravans assemble together for mutual protection near Koko Nor, and merchants and pilgrims together make the adventurous crossing to Lhasa, arriving in August or January. In the northern plateau camels and yaks are used for riding and transport, but it is not permitted to bring camels to Lhasa. Yaks are unsurpassed on seemingly impossible tracks over rocks and boulders, but the small sturdy Tibetan mule is better on slippery grass. Shaggy ponies and

<sup>1</sup> For trade on these routes, see H. L. Shuttleworth, *Geog. Review*, Vol. XIII, 1923, pp. 552-558.

donkeys are also used for riding, whilst the poorer Tibetans attach their possessions to the back of a solitary sheep which they drive before them.

The Buddhism of Tibet entered the country from India mainly between the seventh and ninth centuries, but was reformed from within. Tsong Kapa, born in 1358, was the reformer, but it was two centuries later that Sönam Gyatso received from the Mongol chieftain, Altan Khan, the title of Dalai Lama Vajradhara, 'The All-embracing Lama; the Holder of the Thunderbolt'. So arose the rule of the Priest-Kings of Tibet and the Buddhist monkhood so essentially characteristic of the country.

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The books of travel on Tibet are very numerous, but one of the most useful summaries of present knowledge (from which most of the above account was taken) is Sir Charles Bell's *Tibet, Past and Present* (Oxford: Clarendon, 1924). This may be supplemented from F. Grenard's *Tibet: The Country and Its Inhabitants* (English translation, London: Hutchinson, 1904), in which there is a long general account of the country. Amongst the more important recent works may be noted: E. Teichman, *Travels in Eastern Tibet* (Cambridge University Press, 1922); E. Teichman, 'Journeys through Kam (Eastern Tibet),' *Geographical Journal*, Vol. LIX, 1922, pp. 1-19; F. Kingdon Ward, *The Mystery Rivers of Tibet* (London: Seeley Service, 1923); J. W. and C. J. Gregory, *To the Alps of Chinese Tibet* (London: Seeley Service, 1923).

The work of the great Italian expedition was concerned with Kashmir and Chinese Turkistan as well as with the Karakoram. The results occupy thirteen large volumes, still in course of publication—*Spedizione Italiano De Filippi nell' Himalaia, Caracoram e Turchestan Cinese* (1913-14). The results of the epoch-making exploration of Sven Hedin, 1906-8, were published in a series of large volumes entitled *Southern Tibet*.

### THE PAMIRS

Although the broad lands of Tibet are often referred to as 'the roof of the world', more correctly that name is applicable to the still loftier dissected plateau of the Pamirs. The origin of the word Pamir is doubtful, and the most varied interpretations have been given not only of the origin of the word but of the character of the Pamir region. Correctly, a pamir is a mountain valley of glacial origin, differing in the main from other mountain valleys by its superior altitude—its floor lying from 12,000 to 14,000 feet above sea-level—and 'in the greater degree to which its trough has been filled up by glacial detritus and alluvium and has thereby approximated in appearance to a plain'. Each pamir is thus characterized by a border of snow-crowned peaks, 'sometimes seamed with ice-fields, and terminating in steep shingle slopes or boulder-strewn undulations lower down; in the bottom of the valley a river or stream or mountain torrent,

noisily spreading itself over a stone bed or meandering in a peaty track, and sometimes feeding a lake or succession of lakes; and on either bank of the stream or lake a more or less level expanse of spongy soil, usually covered with coarse, yellow grass, and frequently broken up by swampy patches exactly like the ground on a Scottish moor. With the grassy stretches, which are green and flower-bestrewn in the summer only, and during the rest of the year—when not covered with snow—are sere and yellow, are interspersed expanses of sand and clay and stones, very often overlaid with a powdery incrustation of salts which glitter in the sun like hoar-frost. The main and differentiating features, therefore, of a Pamir are the abundance of pasturage, affording excellent food for every variety of animal and the almost total absence either of timber or of cultivation.' Thus, from one point of view, the Pamirs are rich and fertile, but from the absence of cultivation, habitations, and fuel and from the scourge of icy blasts of the winter months they are often described as savage, inhospitable and desolate. Lord Curzon, from whose account<sup>1</sup> these particulars are taken, states that there are eight true Pamirs lying in an area about 150 miles from north to south and the same distance from east to west, the peaks of the tract lying at elevations of over 20,000 feet. Almost the sole inhabitants are nomadic Kirghiz. Politically the region lies between Russian and Chinese Turkistan and Kashmir, mainly actually in Russian territory.

## PART II. THE TARIM BASIN AND ASSOCIATED BASINS

The detailed exploration of the central part of the dead heart of Asia is associated, in particular, with the name of Sir Aurel Stein. Sir Aurel has published the results of his journeys in a series of volumes,<sup>2</sup> but in the first 'Asia Lecture' of the Royal Geographical Society he gave a brief résumé of the geography of the region, which is of the utmost value to the student. The following descriptive account is based mainly on that summary account, which has a most instructive map of the whole region, and to which reference should be made.<sup>3</sup>

The central belt of the dead heart of Asia consists of a series

<sup>1</sup> 'The Pamirs and the Source of the Oxus', *Geographical Journal*, Vol. VIII, 1896. Many accounts of later explorations will be found in the volumes of the *Geographical Journal*.

<sup>2</sup> *Ancient Khotan*, 1907; *Serindia*, 1921; *Ruins of Desert Cathay*, 1912; *Innermost Asia*, 1928.

<sup>3</sup> 'Innermost Asia: its Geography as a Factor in History', *Geographical Journal*, Vol. LXV, May-June, 1925. See also *Geog. Review*, 1920.



of elevated and drainageless basins stretched out in an east and west line. Their northern limit is well-defined by the big rampart of the Tien Shan—the 'Celestial Mountains'; on the south they are separated from the high plateau of Tibet by the

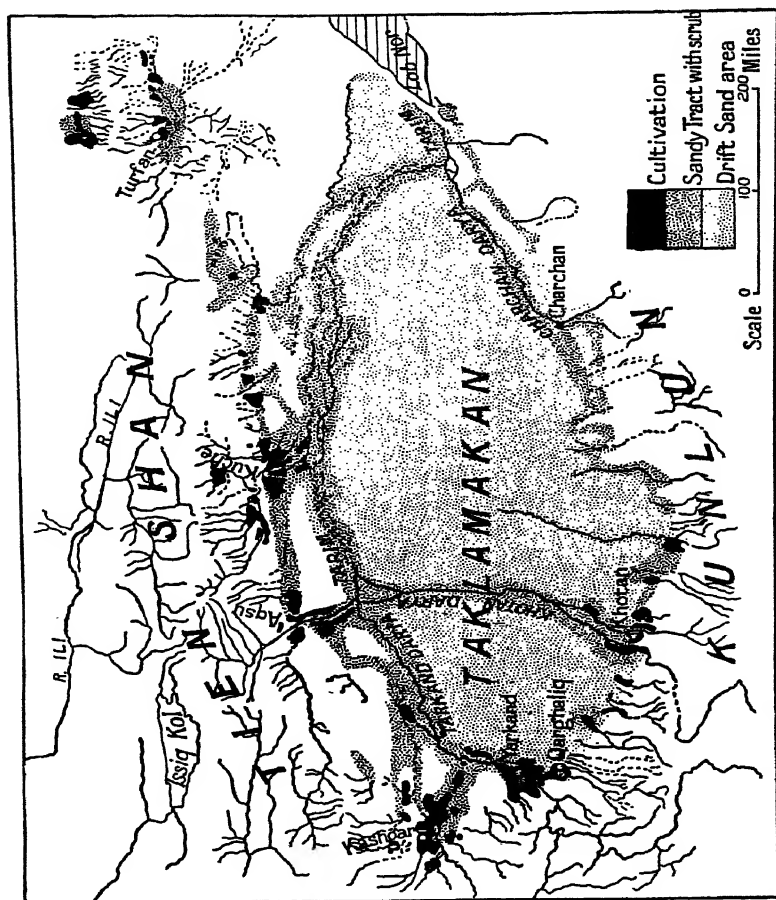


FIG. 290.—The Tarim Basin.

(After Sir Aurel Stein.) For Tarkand Darya, read Yarkand Darya.

still loftier Kunlun with its eastern continuation the Nan Shan. On the west the basins abut on the mighty mountain mass of the Pamirs; the eastern border of the region may be placed where the Nan Shan forms the watershed towards the drainage area of the Pacific Ocean.

The series of basins consists of the huge Tarim Basin in the west, at the eastern end of which is the salt-encrusted sea-bed of the old Lop Sea (Lop Nor is the present-day marshy remnant), and the two small basins of the Sulo Ho and the Etsin Gol in the east. The whole area may be called Chinese Turkistan (as contrasted with Russian Turkistan on the far western side of the Pamirs)—the outer Scythia (*extra Imaon*) of Ptolemy and the Outer Tartary of a century ago.

We will examine, in the first place, the mountains which border this series of depressions. In the west, joining the Tien Shan on the north with the Kunlun on the south, is that great mass of mountains and bleak uplands—the Pamirs, known to the Ancients by the name of *Imaos*. Precipitation on the Pamirs is but slight and glaciation very limited; the high plateau-like valleys drain on the west into the Oxus and its tributaries, on the east into the Tarim Basin. Great importance attaches to the lines of communication through the Pamirs, which served in ancient times as arteries of trade and cultural relations between the Oxus region and the Tarim Basin, and thus eventually between Greece and Rome on the one hand and China on the other. Despite the general east-to-west trend of the Pamir valleys, apparently only two routes were of real importance:

- (a) The southern route is up the main Oxus Valley, through Sarigol to Kashgar and Yarkand. This is the route followed by Marco Polo in his famous journey in 1273 and before him by the great Buddhist pilgrim Hsüan-tsang returning to China from India in 644.
- (b) The northern route is from the ancient centre of Bactra (modern Balkh) up the Surkh Ab or Qizil Su, crossing the saddle to the headwaters of the river of Kashgar and so down to the oasis of Kashgar. This route was far more important as a trade route and is the one which was followed by the ancient caravans bringing silk from China in the days of Greece and Rome. It is this route which accounts for the remarkable part played by the Tarim Basin 'for close on a thousand years as the main channel for the interchange of cultural influences between China, India and the Near East'.

On the southern flank of the basins lies the great mountain rampart of the Kunlun. In the west the chain starts as a series of buttresses to the glacier-clad Karakoram; further east it rises to form a practically impenetrable barrier with a crest-line of about 20,000 feet for a distance of 300 miles. The few streams which break through the outer ranges into the basin to the north do

so by deep-cut, inaccessible gorges. The outer slopes of the Kunlun in the Khotan section of the Tarim Basin are extraordinarily barren and forbidding. 'Here by the side of wide loess-covered peneplains we find areas where a perfect maze of steeply serrated ridges and deep-cut gorges has been produced by erosion. Yet only on rare occasions do these barren slopes, unprotected by vegetation, receive any heavy rain or snow fall. But when it does come the great aridity of the climate helps to make its erosive force all the more effective.' Eastwards for some 400 miles the Kunlun takes on a north-easterly trend as far as Lop Nor, where the outermost range of the Kunlun is known as the Altyn Tagh. Whatever may be the morphological relation between the systems, the Kunlun here becomes lower, easterly in its trend and begins to merge imperceptibly into the Nan Shan, the 'southern mountains' of the Chinese.

Throughout the whole length of the Kunlun chain, the foot of its northern slopes is formed by a 'glacis of piedmont gravel, attaining in parts a width of 40 miles and more and everywhere utterly barren'.

The western portion of the Nan Shan overlooks a small basin—the Sulo Ho trough. Here the western Nan Shan reproduces very closely the features of the Kunlun—with their arid northern slopes and marked erosion. But there is a more marked division with successive parallel ranges growing higher towards the south and, although reaching heights of 20,000 feet in the south, giving easier access to the open uplands beyond than in the Kunlun.

East of the Sulo Ho trough the central portion of the Nan Shan shows evidence of a moister climate. The moisture which penetrates from the Pacific affords excellent summer grazing in the high valleys and still further to the south-east there are forests in the valleys drained by the Kanchow River. Immediately to the east is the watershed between the inland drainage and the Pacific Ocean drainage of the Hwang Ho Basin.

The water from the Central Nan Shan drains into the Etsin Gol. The Etsin Gol Basin is the easternmost of the basins of inland drainage in this central belt.

Turning now to the northern rim of the basins, to the north of the Etsin Gol and Sulo Ho basins, are low, uniform desert hills—very insignificant when compared with the snowy heights of the Nan Shan to the south.

Northwards and westwards of these ridges lies a huge desert area—the barren ranges and plateaus of the Pei Shan (the 'Northern Mountains' of the Chinese). This is a vast, stony, waterless tract, still largely unexplored, devoid of life and

swept by violent icy winds from the north-east in winter and even late in spring.

To the east of the Hami oasis there starts the great mountain chain of the Tien Shan, which extends unbroken westwards far beyond the Tarim Basin and throughout forms its northern rampart. This is the dividing line between the central and northern tracts of Central Asia. To the north the wide, open plateaus are moister and capable of supporting nomadic races who, in times past, have found it worth while to cross the Tien Shan and raid the oasis settlements of the Tarim Basin. The Tien Shan is not, as may be gathered from this statement, as impenetrable as the Kunlun. The leading passes include the Barköl Daban, and the low saddles of Tashihto and Tapancheng at either end of the Bogdo Ula massif. Further west, too, are routes leading down to the cultivated tracts of Kucha, Aqsu and the open valley of the Taushquan Darya, as well as via the Terek and Turug Art passes to Kashgar.

Having completed the circuit of the encircling walls, we now turn to the basins themselves. By far the most important is the great Tarim Basin itself; the small, narrow Sulo Ho and Etsin Gol Basins are mere appendages like an eastern tail.

The *Tarim Basin* is a pear-shaped area about 900 miles from east to west and a width from north to south of as much as 330 miles. Despite the huge area, the arrangement of the basin is comparatively simple.

(i) By far the largest area is occupied by the huge central desert of bare sand-dunes, popularly known as the Taklamakan. This is perhaps the most formidable of all the dune-covered wastes of the globe—a 'true' desert as opposed to what has been called 'tame' desert.<sup>1</sup> The drifting soil of the Taklamakan is referred to as sand for want of a better name. It consists really of fine, disintegrated particles of rock and is of the character of alluvial loess. It is very fertile in itself, and wherever irrigated is capable of producing excellent crops. Hence there is no danger of sand-dunes approaching close to the irrigated fields of the margin of the basin, for the moisture binds the fertile soil and thereby stops the further advance of the dunes. In addition to individual dunes whose form and position is determined by the prevalent wind direction (mainly from the north-east), there are big hill-like ridges rising to a height of 300 feet or more known as 'Davans'. In general they seem to lie parallel to the old watercourses.

<sup>1</sup> A tame desert may in years of good rainfall become partly covered with grass or herbs and so support life. Compare the plain of Dera Ismail Khan in India.

(2) On the west, north and east the central waste is bounded by the belts of vegetation along the Tizna<sup>f</sup>, Yarkand and Tarim Rivers. On the south a line of oases, mostly small, stretches along the foot of the gravel glacis of the Kunlun, continued eastwards by patches of sandy jungle intermittently watered by small streams. Thus there is a narrow belt of vegetation right round the basin—in places with areas of sand-dunes beyond it. Where the cultivated ground or the jungle belt begins to fade into the lifeless Taklamakan there is first a zone with desert vegetation—tamarisks, wild poplars or reeds—and in this zone a peculiar feature is the 'tamarisk cone'—hillocks of drift sand around a tuft of tamarisk which may, after centuries

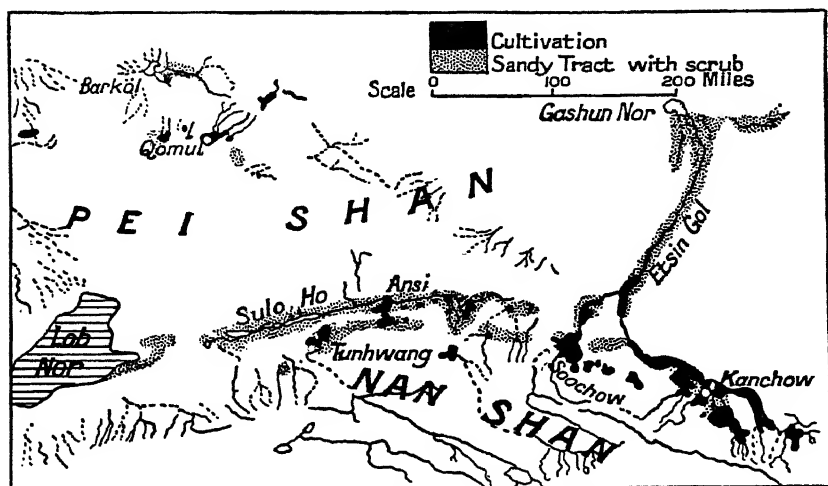


FIG. 291.—The Sulo Ho and Etsin Gol Basins—the eastern 'tail' of the great Tarim Basin.

(After Sir Aurel Stein.)

of growth, reach a height of 50 feet or more. 'Further out in the Taklamakan there emerge from the dunes only shrivelled and bleached trunks of trees, dead for ages, or sand cones with tamarisk growth from which life has departed.'

(3) At the foot of the encircling mountains is a belt built of gravel swept down from the mountains, especially on the south along the Kunlun. From each gorge a huge fan of gravel spreads out, though the streams are rarely permanent. Much of the water is lost by evaporation or absorption on its way across the huge glacis of gravel; a stretch which is unsuitable for irrigation. All cultivated areas along the southern margin of the desert are thus 'terminal oases'—they occupy the further-

most ground to which water from the rivers of the Kunlun can be brought for irrigation. 'Not one of the numerous rivers descending from the snowy Kunlun succeeds in making its way through the Taklamakan, except the Khotan River, and that, too, only during a few summer months. All the rest are lost in this "sea of sand" at a greater or lesser distance from the line occupied by the oases or the areas of desert vegetation which they adjoin.'

Special interest attaches naturally to the oases of the Tarim Basin—the only habitable parts of the basin—although they appear as mere specks in the great expanse of the whole basin. There are two clearly marked belts of oases:

- (a) The western and northern marginal arc, containing the important oases of Yarkand, Kashgar, Kalpin, Aqsu and Kucha. Owing to the position of these main oases and the convenient stages at which the smaller ones are strung out between them, the route passing along this belt has from the earliest historical times to the present day been the chief line of communication and trade within the Tarim Basin.
- (b) The southern marginal arc, stretching along the foot of the Kunlun, has only one oasis of note, that of Khotan. The main reason for this has been mentioned above—the unsuitability of the gravel fans for irrigation—but there is also the added difficulty of maintaining canal heads where the shifting river-courses pass over their fans of gravel.

Owing to the uniform aridity of the climate and the comparatively small variation in altitude—all the important oases mentioned above lie between 3,300 and 4,500 feet above sea-level—all the oases are strikingly similar. 'Whatever their position or size, the traveller sees everywhere the same fields of wheat, maize, or cotton, slightly terraced for irrigation; the same winding lanes lined with white poplars and willows; the same little arbours or orchards inviting with their shade and their plentiful produce of European fruits.' It must be emphasized that the whole Tarim Basin is extremely arid. Kashgar is favoured, when compared with districts east and south, by its relatively large precipitation of about 2 inches per annum. Hence there are in the Tarim Basin no open grazing grounds, but only the carefully irrigated oases and the narrow strips of riverine jungle which can support life, either human or animal. A peculiar feature of the atmospheric conditions is the constant dust haze which hangs over the basin and rarely allows the traveller to catch a glimpse of the great enclosing ranges. When

the air is still this fine dust settles and adds naturally to the fertile soils of the oases. When the wind is strong—the strong winds are the north-easterlies—this dust is carried on to the slopes of the Kunlun where true aerial loess several hundreds of feet in thickness occurs up to elevations of 12,000 to 13,000 feet. Much of this loess is in turn washed down into the streams and so back to the basin from which it was removed by wind erosion.

At the eastern end of the Tarim Basin is the depression of Lop<sup>1</sup>—the most desolate of all the natural divisions of the basin. It comprises the stretch of marshes (Lop Nor) into which the waters of the Tarim pass and finally disappear and the great salt-encrusted bed of the dried-up Lop Sea beyond, together with the wastes of gravel, drift sand and wind-eroded clay which surround it. A handful of Lopliks fish and hunt in the Tarim marshes, and a few hundred people live in the little oases along the Kunlun, otherwise the whole vast area is uninhabited.

The *Sulo Ho Basin* has a length of about 220 miles from east to west, but is a narrow trough bounded by the slopes of absolutely bare gravel descending from the western Nan Shan on the south and the utterly barren Pei Shan on the north. The Sulo Ho is fed by the glaciers and snows of the central Nan Shan and descends into the basin at its eastern end. Its sole affluent, the Tang Ho, provides water for irrigating the main oasis of the basin, the oasis of Tunhwang or Shachow. The importance of the Sulo Ho Basin is that, flanked by high mountains on the south and desert wastes on the north, it forms a natural and easily defended corridor leading from North-western China into Central Asia. This importance is emphasized by the existence of remains of the ancient Chinese *Limes* or border wall along the trough.

The tiny basin of the Hwahaitze or Yingpan oasis lies between the eastern end of the Sulo Ho Basin and the Etsin Gol Basin.

The *Etsin Gol Basin* stretches east and west from the Pacific watershed to Suchow, whilst the Etsin Gol itself flows away to the north-north-east far towards Mongolia before losing itself in the Gashun Nor. We are now within the influence of moisture-laden breezes from the Pacific: a continuous line of villages lies along the northern foot of the eastern Nan Shan. Cultivation is carried on with the help of rainfall and snowfall only (especially east of Kanchow), as well as by irrigation from the mountain streams. The course of the Etsin Gol to the north

<sup>1</sup> For details, see Ellsworth Huntington, 'Lop-Nor, A Chinese Lake', *Bull. Amer. Geog. Soc.*, Vol. XXXIX, No. 2, 1907.

is important, because it furnished a convenient line of approach for raiders from the Mongolian steppes.

We cannot leave the Tarim Basin without referring to the fascinating problem of the supposed desiccation of Central Asia. Sir Aurel Stein, reviewing the evidence afforded by archaeological discoveries, says that two conclusions are inevitable. 'One is that climatic conditions quite as arid as the present ones prevailed within the big trough of the Tarim Basin as far back as ancient remains and available records can take us. The other conclusion is that the amount of water carried by its rivers has greatly diminished during the same historical period.' One explanation of these apparently contradictory conclusions has been suggested independently by Sir Sidney Burrard and Dr. Ficker. It is that the diminished volume of the rivers is due to the shrinkage of the glaciers of the high ranges which are their main feeders. This shrinkage is explained by supposing the glaciers themselves are great reserves of ice which were left behind by the great Ice Age and have since been undergoing slow but continuous reduction through milder climatic conditions. This is borne out by the enormous thickness of *débris* which overlies the Kunlun glaciers. It will be noted that this explanation is really equivalent to saying that of course there has been a gradual climatic change since the Ice Age—a progressive desiccation—but that alterations in the amount of atmospheric moisture reaching the Tarim Basin cannot be detected within historic times.

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Sykes (Miss Ella and Sir Percy), *Through Deserts and Oases of Central Asia*, 1920.

Ellsworth Huntington's well-known work, *The Pulse of Asia* (1908), deals with the travels of a trained geographer through the area and contains that author's now famous theories of cyclic climatic changes.

#### PART III. MONGOLIA

The vast, indefinite tract of country called Mongolia may be broadly said to comprise the north-eastern half of the central mass of Asia's plateaus; bounded by Siberia on the north, Manchuria on the north-east, China on the south-east and Chinese Turkistan on the south-west. The Khingan Mountains form its natural boundary on the east, the Altai and Khangai Mountains



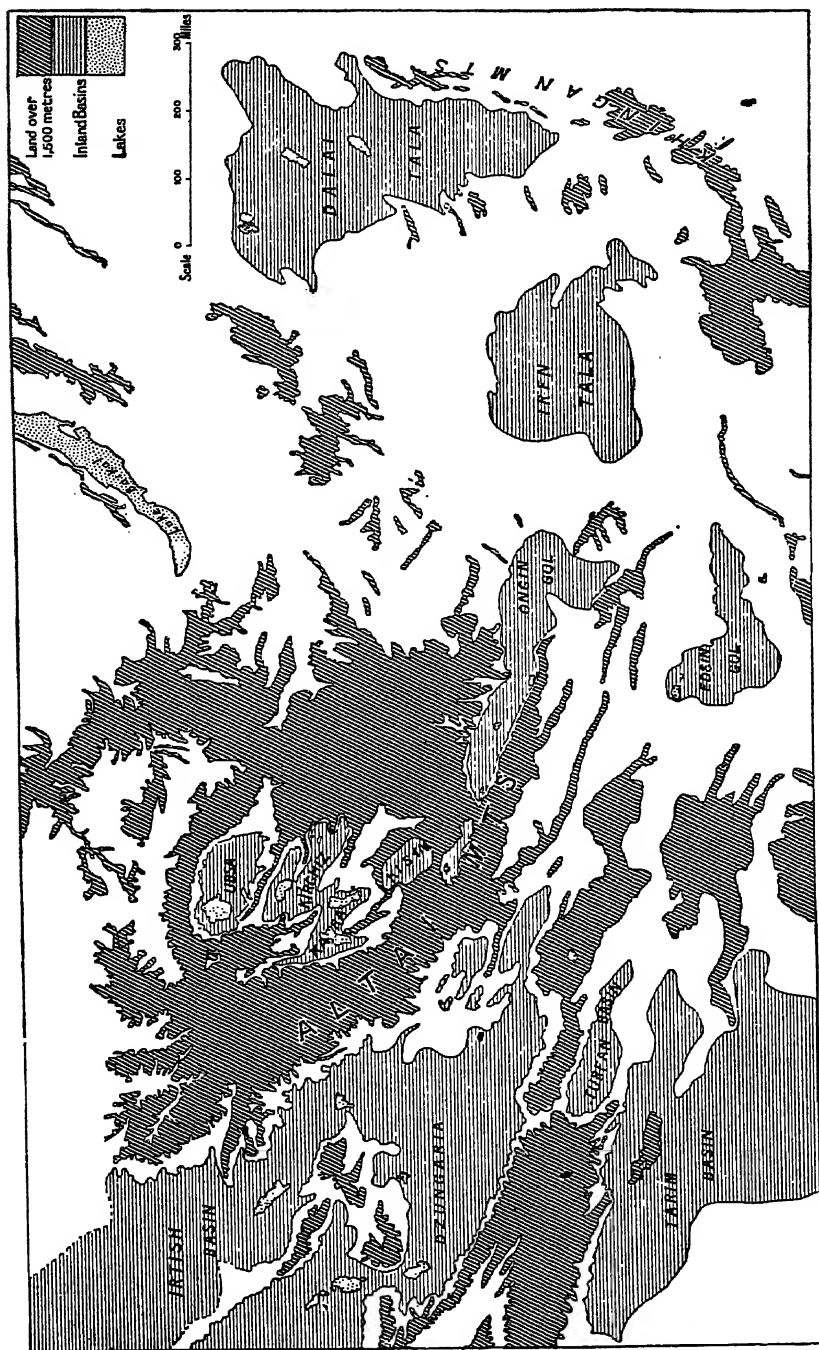


FIG. 292. —The Basins of Mongolia, according to Berkey and Morris.

penetrate into its heart from the west. The area is roughly 1,875,000 square miles, the total population probably under a million—consisting of nomadic Mongols and Kalmucks, who range the deserts with camels, horses and sheep.

From the broadest possible point of view Mongolia consists of the great central desert of Gobi or Shamo, continuous with that of Chinese Turkistan to the south-west, but fringed on the north-west, north-east and east by a more fertile belt. The results of the recent expeditions of the American Museum of Natural History under the leadership of R. C. Andrews, have added much to the general knowledge of the whole area. Two geologists of the expedition, Messrs. Berkey and Morris, have given a general account of the topography and geology.<sup>1</sup>

The great basin of the Gobi contains many minor basins, which Berkey and Morris have called 'talas'. They distinguish the Dalai Nor tala, the Iren tala, the Etsin Gol tala, the Kirghiz

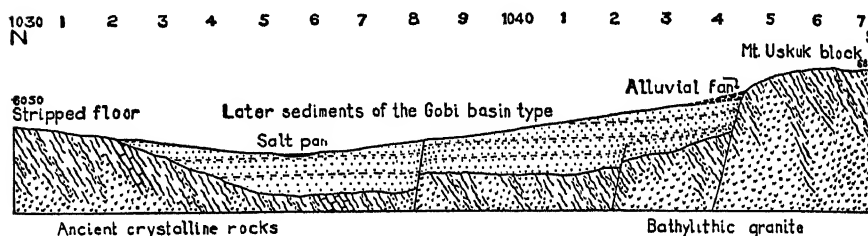


FIG. 293.—Cross-section of a typical Mongolian basin. The basin north of Usuk Mountain.

Nor tala and the Ubsa Nor tala. Each tala has its own local interior drainage and is bounded by inconspicuous warp divides or by mountain ranges. Within each tala are still smaller basins which contain late Mesozoic or Tertiary sediments. These Berkey and Morris have termed 'gobis'. It would seem that underlying Mongolia is an immense pre-Palæozoic floor, probably a granite batholith, perhaps of unrivalled dimensions. Central Mongolia was a continental mass standing above sea-level during the Lower and Middle Palæozoic, submerged during the Carboniferous and Permian, since when it has formed a land mass and a long succession of continental deposits has been laid down on the surface of the plateau and in the basins, and these beds have yielded a wonderful series of fossils, notably of land animals. The erosion of the shallow basins which is going on at the present day and has probably been in progress for ages, is wind erosion. It is from these arid wastes of the dead heart of Asia that the

<sup>1</sup> *Geology of Mongolia: Natural History of Central Asia*, Vol. II, 1927.

winter winds bring their load of dust, which, in course of time, has built up the great loess deposits of Northern China. The cliffs on the edges of the eroded basins are often grotesque in the extreme and afford beautiful examples of the erosive action of wind, frost and rain.<sup>1</sup> The north of the desert, the grassland fringe, is comparatively level. Belts of sand-dunes occur locally in the desert, one of the most remarkable areas being a strip 100 miles long but only 2 or 3 miles wide near the northern foot of the Eastern Altai. Sand-dunes are also found on the southern or western shores of almost every desert lake.

The fringe of Mongolia is rolling pasture land, varying in the quality of the pasture; the heart is desert. In the southwest 'tamarisk and sand' summarizes the character of the desert. An interesting account of a recent journey through the southern part of Mongolia is given by Owen Lattimore in his *Desert Road to Turkestan* (London: Methuen, 1928). In the great central desert, the floor is composed of rock rather than of sand—a circumstance which permitted the American Expedition to carry out their work by motor-cars—and the desert vegetation consists of short wiry grass, camel sage, and low thorny bushes. Great stretches of the surface are almost flat, and a shower of rain will produce almost miraculous changes—the dry, yellow, gravelly surface becomes tinged with a delicate green as far as the eye can reach. The slopes of the mountains, such as the Eastern Altai, are either bare or covered with short grass, so too are the enormous alluvial fans of débris washed out by the occasional torrential rains which fall on the higher peaks of the mountains. The only places where trees are found in the Gobi are in the few river bottoms. They are all old trees—especially elms—and there is no sign of new growth.

The climate of Mongolia is severe in the extreme. During the winter the temperature drops to 40° or even 50° below zero, and the summer is very short. The American Expedition found that, for climatic reasons, scientific work could only be carried out between April 1st and October 1st. A blanket of snow covers the peaks of the higher ranges, such as the Altai, except for a few weeks in August.

Repeated references have been made in this book to the fact that the heart of Asia has been a continental mass since remote times. Dr. Chaney, of the American Expedition, considers the Khingan Mountains acted as a climatic barrier in the Cretaceous and Tertiary times, just as they do to-day, permitting

<sup>1</sup> Berkey and Morris attribute the peneplanation of surfaces so characteristic of Mongolia to stream action during flood, but recognize the transporting power of wind.

the growth of sequoia forest 'whose moisture requirements were about 40 inches a year' on the windward side, whilst arid and semi-arid conditions on the northern side limited tree growth to scattered conifers and poplars.

For long the hypothesis that Central Asia was the ancestral home of man rested upon theoretical evidence only. Remarkable confirmation is afforded by the discovery in the heart of Mongolia of no less than five cultural horizons—'Eolithic', Upper Palæolithic (with stone implements of Mousterian and Aurignacian types), Mesolithic, Neolithic and later. Special interest attaches to the Mesolithic-Neolithic cultures, the remains of the one found superimposed upon the other in an old sand-dune belt in the heart of the Gobi Desert. From the location of the remains the people have been called the Mongolian 'Dune-Dwellers'. The relatively moister conditions indicated by these discoveries have been confirmed by the discovery of scratched rock surfaces in the grasslands of North Central Mongolia, showing representations of game animals no longer living in the region. Or the whole the results of the American Expedition's work confirm the sequence of climatic changes worked out by Ellsworth Huntington in the more southerly parts of Central Asia.

At the present day a distinction may be drawn between Outer Mongolia, which, after the revolution of 1924, became independent with a Soviet form of government (in the north west of Mongolia is also the separate Soviet republic of Tannu Tuva), and Inner Mongolia, which fringes China and Manchuria and some of which now lies in 'Manchukuo'. Outer Mongolia is thus a Russian sphere of influence, Inner Mongolia Japanese. The Mongols of Outer Mongolia are typical nomadic steppe dwellers; in Inner Mongolia the vanguard of the Chinese agriculturists is penetrating year by year further and further from the Chinese border into Mongolia, pushing the nomadic Mongol before them. The railway penetrates from Peking via Kalga and Kweihwa to Suiyuan. From Kalgan and Kweihwa the caravan routes across the desert start.

The chief town or centre of population of Outer Mongolia is Urga, 170 miles south of the Siberian frontier at Kiakhta and there is an important caravan trade along the main route between Kiakhta, Urga and Kalgan. A motor service between Kalgan and Urga was inaugurated in 1917 and runs in summer months, the journey occupying three days. Wools, hides and skins, furs, horns, etc., are the chief items of export. It is interesting to note that in the early part of the nineteenth century, before the opening of Northern Chinese ports to foreign trade, considerable quantities of British goods found their way

from Nijni-Novgorod, across Siberia, and into China by this route.

In the section on Chinese Turkistan an account is given of the Trans-Asiatic routes which pass through that region. There are, in addition, trans-continental routes across Mongolia.<sup>1</sup> They all start from the railway at Kweihwa and diverge at Pailing Miao.

- (1) The Uliassutai-Kobdo Road runs to the north of the Altai.
- (2) The Great and Small Mongolian Roads which join at Khara-niuto run to the south of the Altai and have Ku Ch'eng-tze as their objective.

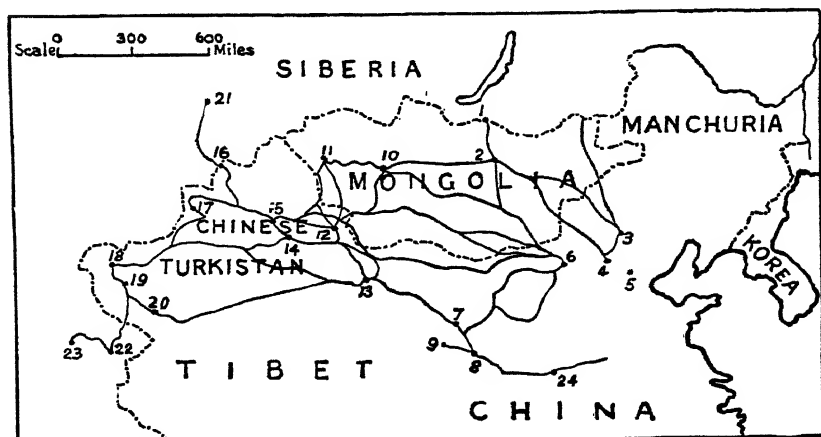


FIG. 294.—The principal routes of Mongolia and Chinese Turkistan.

- |               |                 |                    |
|---------------|-----------------|--------------------|
| 1. Kiakhta.   | 9. Sining.      | 17. Kuldja.        |
| 2. Urga.      | 10. Uliassutai. | 18. Kashgar.       |
| 3. Dolon Nor. | 11. Kobdo.      | 19. Yarkand.       |
| 4. Kalgan.    | 12. Barköl.     | 20. Khotan.        |
| 5. Peking.    | 13. Ansi.       | 21. Semipalatinsk. |
| 6. Kweihwa.   | 14. Turfan.     | 22. Leh.           |
| 7. Liangchow. | 15. Urumtsi.    | 23. Srinagar.      |
| 8. Lanchow.   | 16. Chuguchak.  | 24. Sian.          |

These routes may be traced out on a good physical map. Ku Ch'eng-tze, mentioned in the text, is situated at the junction of routes between 12 and 15; the route to Tashkent goes westwards from 17.

- (3) The Winding Road or the 'Desert Road' runs further south, also to Ku Ch'eng-tze.

The first of these roads leads on across the mountains north of the Altai to Barnaul; the second and third run together to Urumchi and afterwards fork, the northern branch going via the famous Dzungarian Gate to Sergiopol (from whence the railway at Semipalatinsk is easily reached), the southern branch through Semireychensk to Tashkent.

<sup>1</sup> See Owen Lattimore, *The Desert Road to Turkestan* (Methuen, 1928).

It is unfortunately impossible in the limited space here available even to attempt an adequate account of the great heart of Asia. Until recently so little known, the stories of exploration by travellers still living afford fascinating reading. Among the classics comes Sir Francis Younghusband's account of his early journeys in the 'eighties and 'nineties of last century, *The Heart of a Continent* (London: Murray, 1896). For an account of the rugged Mongolian-Russian borderlands there is Douglas Carruthers' *Unknown Mongolia* (2 vols., London: Hutchinson, 1913). See also the summary of work carried out in 1917-20 by Finnish geographers and published as the first part of *Acta Geographica* (Geographical Society of Finland)—summarized in *Geographical Journal*, Vol. LXXI, 1928, pp. 502-3. Langdon Warner's *The Long Old Road in China* (New York: Doubleday, Page, 1926) deals with the old North-west Road. A very important work is W. Karamisheff's *Mongolia and Western China* (Tientsin: La Librairie française). In this are given full details of trade, trade centres and trade routes, as well as analyses of the economic possibilities of Mongolia. For a full scientific treatment of Central Mongolia there are the voluminous reports of the Expeditions of the American Museum of Natural History. Berkey and Morris' *Geology of Mongolia* has been mentioned; their preliminary summary 'Basin Structures in Mongolia' (*Bull. Amer. Mus. Nat. Hist.*, Vol. LI, pp. 103-127, 1924) will be found of especial value to geographers. A general summary is given by R. C. Andrews in *The New Conquest of Central Asia*, 1932. For some recent details of trade routes, see M. Cable, 'The Bazaars of Tangut and the Trade Routes of Dzungaria', *Geog. Jour.*, Vol. LXXXIII, 1934, pp. 17-32. For a summary of the political position in Central Asia in 1935 see Peter Fleming's articles in *The Times*, November-December, 1935. Sinkiang is clearly more under the influence of Moscow than of Nanking.

## CHAPTER X

### THE JAPANESE EMPIRE

THE island kingdom of Japan has often been called the 'Britain of the East'. Both Britain and Japan are groups of islands lying in temperate latitudes and a short distance off continental masses, but there the comparison may almost be said to end. Britain lies to the north-west, Japan to the north-east of the great continental mass of Eurasia; consequently whilst Britain has a 'west-coast' climate, benefiting to the full from the warming influence of the North Atlantic drift and the westerly wind belt, Japan has an 'east-coast' climate, suffering from cold winter winds and heavy summer monsoon rains and only benefiting partly from the warming influence of the Kuro Siwo—the Gulf Stream of the Pacific.

Japan proper consists of four large islands, forming a long curve from north-east to south-west. Included also in the Japanese Empire are half of the island of Sakhalin in the north, the tropical island of Taiwan in the south, together with a festoon of islands which connects it with Japan proper, and the important peninsula of Korea on the mainland of Asia.

The relative areas of the constituent parts of the Empire are shown in the following table:

	Area, including Adjacent Small Islands, in Square Miles.	Per Cent.
Japan Proper . . . . .	147,201	56.63
Mainland . . . . .	87,805	33.74
Shikoku . . . . .	7,246	2.78
Kyushu . . . . .	16,174	6.21
Hokkaido (Yezo) . . . . .	30,115	11.57
Chishima Isles . . . . .	3,970	1.53
Other Islands . . . . .	1,891	0.74
Chosen (Korea) . . . . .	85,228	32.75
Taiwan (Formosa) . . . . .	13,840	5.32
Hōkotō (Pescadores) . . . . .	49	0.02
Karafuto (Japanese Sakhalin) . . . . .	13,934	5.35
Japanese Empire . . . . .	260,252	100.00

Japan proper extends from about  $30^{\circ}$  N. to  $45^{\circ}$  N., but running through the island of Taiwan (Formosa) is the Tropic of Cancer, whilst Japanese territory in Sakhalin extends to  $50^{\circ}$  N. The Japanese Empire thus covers a wide latitude, but the whole

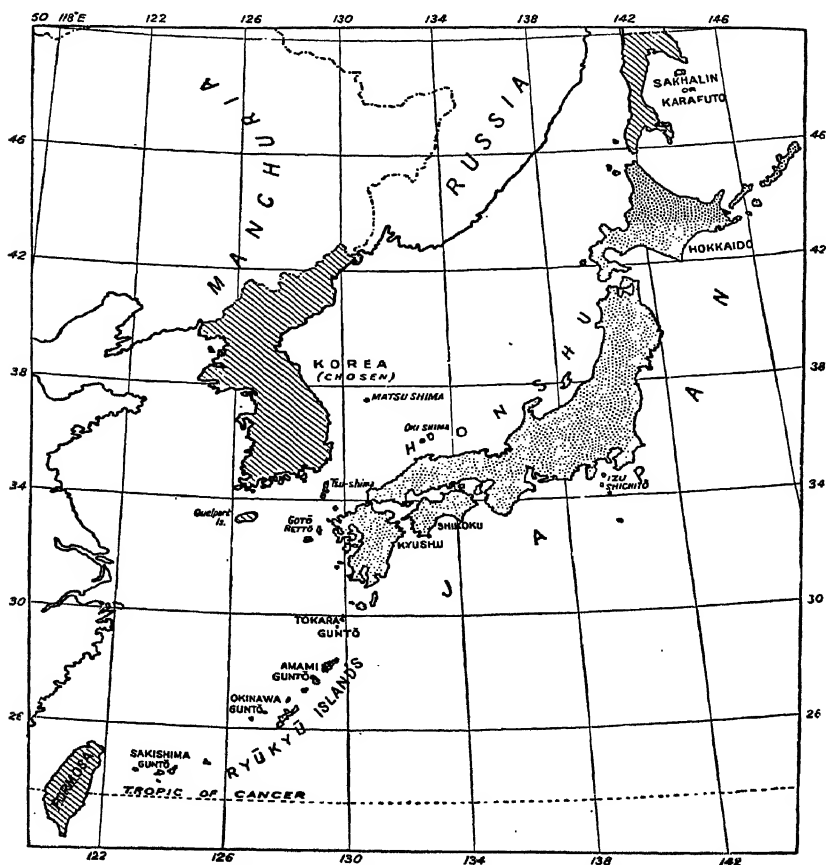


FIG. 295.—The Japanese Empire. Political.

Japan proper is dotted; possessions lined.  
In addition, Japan has a lease over the Liaotung Peninsula (see p. 541).

is nearer the Equator than are the British Isles. In all there are nearly 1,700 small islands in the Empire.

Broadly speaking, the Japanese Empire comprises two economic zones. There is an inner, densely populated—one



might say over-populated—central zone, unable to produce sufficient food to be self-supporting and to a considerable extent industrialized, and an outer, under-populated zone, the function of which is to supply food and raw materials to the inner zone.

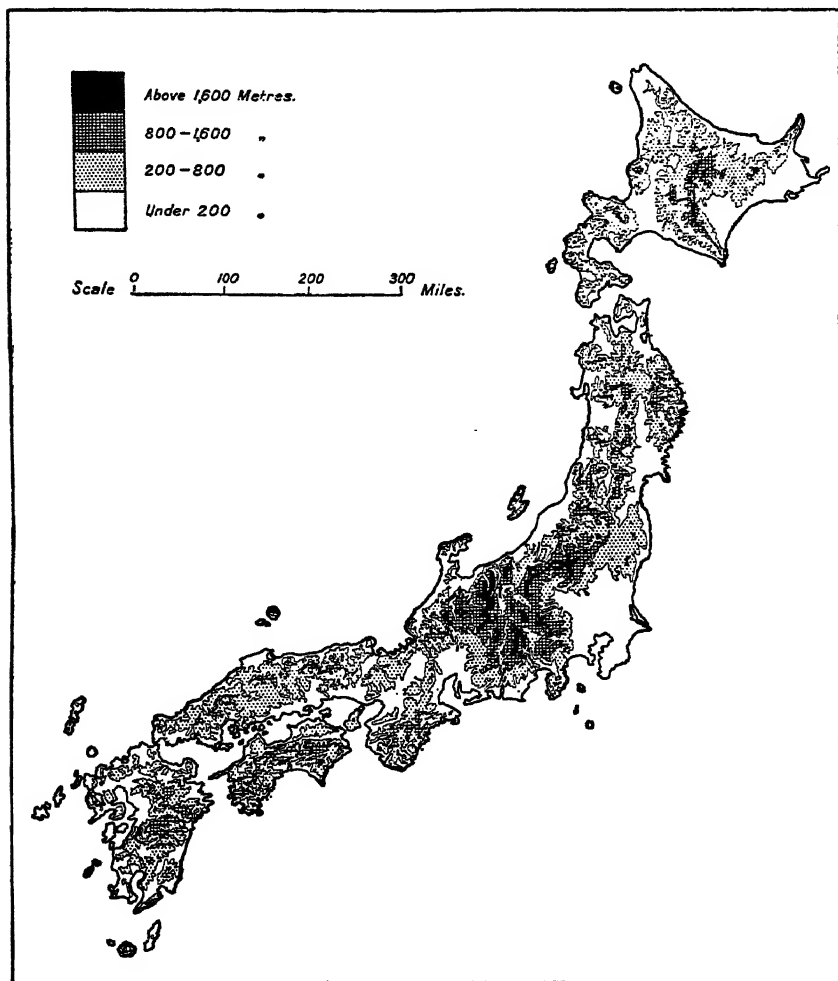


FIG. 296.—A physical map of Japan proper.

The inner zone is practically identical with Old Japan ; Hokkaido, the 'northland' of Japan, is still a frontier or pioneer land although administered as part of Japan proper. Thus Hokkaido may be said to belong to the outer zone, which includes Korea,

Taiwan and Karafuto. There will be, obviously, a marked contrast between the two zones; for that reason it is desirable to deal separately with Old Japan and then with the outlying territories.

### OLD JAPAN

Japan, including Hokkaido, as the above table shows, forms between 56 and 57 per cent. of the total area of the Empire, but had in 1931 about 70 per cent. of the total population.

**Physiography and Structure.** Nearly all parts of Japan are mountainous and at first sight the arrangement of the mountains is irregular. Broadly, however, two parallel chains of mountains may be distinguished, each forming a long curve. The one curve lies close to the west coast, the other to the east coast. The midland valley which lies between the two chains is most clearly marked in the south-west, where it is occupied by the famous Inland Sea. Elsewhere it is obscured by great volcanic piles, the volcanoes showing a tendency to lie along lines at right angles to the folded chains. The midland valley is completely obliterated by the great knot of mountains in the heart of Hondo, forming the 'Japanese Alps', of which more than a dozen peaks rise to over 8,000 feet. Many of these central peaks are active or extinct volcanoes and include the most familiar and perhaps the most famous of all mountains, Fujiyama, the sacred mountain of the Japanese. In Hokkaido there is a central knot of mountains, due to the meeting at right angles of the Japanese fold ranges and the fold range which forms the Kurile festoon. Similarly in Kyushu, the Ryukyu fold chain crosses the Japanese folds—all with their attendant volcanic piles.

An excellent physiographic diagram of Japan has recently been prepared by Guy-Harold Smith and published with explanatory notes by G. T. Trewartha.<sup>1</sup> He points out the essential youthfulness of Japanese topography and notes that the small plains are not structural but are patches of riverine or wave-worked sediments developed in mountain basins or coastal indentations. Often these delta plains terminate abruptly against the surrounding foothills; only in some cases is there a piedmont belt of coarse-textured alluvial fans. Numerous terraces bear evidence of recent uplift; they consist of unconsolidated material undergoing rapid erosion and so exhibit narrow, canyon-like valleys with flat to gently sloping inter-stream uplands.

Trewartha distinguishes four geomorphological 'zones' in Japan, shown in the accompanying map.

<sup>1</sup> *Geographical Review*, Vol. XXIV, 1934, pp. 400-3; see also G. T. Trewartha, *A Reconnaissance Geography of Japan*, Wisconsin, 1934.

The 'Outer' and 'Inner' zones are parallel zones of contrasted geological structure; fault scarps and tectonic depressions mark their contact.

- (a) The south-western Outer Zone (Pacific Folded Mountains) consists of well-developed longitudinal ridges and valleys

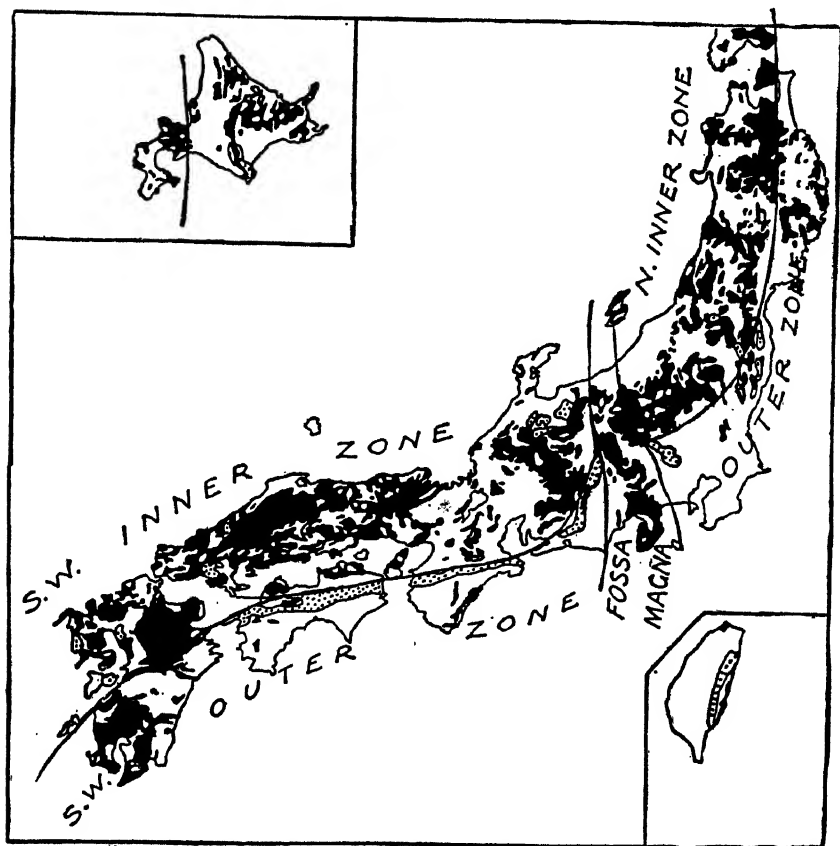


FIG. 297.—The geomorphological zones of Japan.

(After G. H. Smith and G. T. Trewartha.)

Volcanic rocks in black, ancient crystalline masses dotted.

often bounded by parallel fault lines and consisting of old, highly folded strata forming rugged mountains.

- (b) The south-western Inner Zone consists of dissected block plateaus, mostly rugged hill country, and is marked by widespread volcanic activity. Eastwards it terminates in a tremendous fault scarp overlooking the 'fossa magna'.
- (c) The Outer Zone (Pacific) of Northern Japan is separated

from the Inner Zone by the line of tectonic depressions extending from the Ishikari-Yufutsu lowland in Hokkaido to the bay-head plain of Kwanto. The complicated structure resembles that of the south-western Outer Zone.

- (d) The Inner Zone of Northern Japan consists of two parallel ranges of highland, separated by a series of detritus-floored fault basins. The central range forms the backbone and watershed of Northern Japan and consists largely of Tertiary sediments.
- (e) The Fossa Magna is the great rift valley—a line of weakness naturally developed at right angles to the folded chains. The rift valley has been largely filled by the huge volcanic piles of which Fujiyama is the best known.

It is already clear that Japan can boast no large plains. Indeed, land inclined at angles of less than 10 degrees (equal to a slope of 1 in 7) does not exceed a quarter of the whole. The only extensive plain is that known as the Kwanto Plain, around Tokyo, which supports 12 million people. The smaller Nobi Plain contains Nagoya and 4½ million people; the Kinki Plains, Kyoto, Kobe and Osaka and 6 million people. The fertile land of Japan is to be found in these and other small plains and in the valleys of the larger rivers. But only a fifth of this mountainous country may be classed as cultivable, or at the most optimistic estimate, only a little over a quarter. The rivers of Japan are short and swift, of little or no value for navigation, but of considerable significance as a source of power and for irrigating the rice-fields.

From the irregular nature of the coast-line Japan is well supplied with harbours. Indeed, the Inland Sea may be described as one gigantic harbour penetrating to the heart of the most fertile part of the country; few rivers drain into it to cause silting, it has but a very small tide (2 feet) and is protected from winds and storms from all directions.

The intense nature of the Alpine folding and the extraordinary

#### DISTRIBUTION OF ROCK-TYPES IN JAPAN

	Per cent. of Surface.
<i>Sedimentary Rocks</i>	
Archean . . . . .	67·84
Palæozoic . . . . .	3·78
Mesozoic . . . . .	10·24
Cainozoic and Quaternary . . . . .	7·95
<i>Igneous Rocks</i>	
Older . . . . .	45·87
Tertiary and Recent . . . . .	32·16
	11·24
	20·92

development of vulcanicity have resulted in a very complex geological map of Japan. Igneous rocks occupy nearly a third of the surface, as shown in the preceding table.

It will be noticed to what a large extent Alpine material enters into the Alpine folds, and that a relatively small area of the Archean core is exposed.<sup>1</sup>

No account of Japan would be complete without a reference to the seismic disturbances which are the curse of the country.

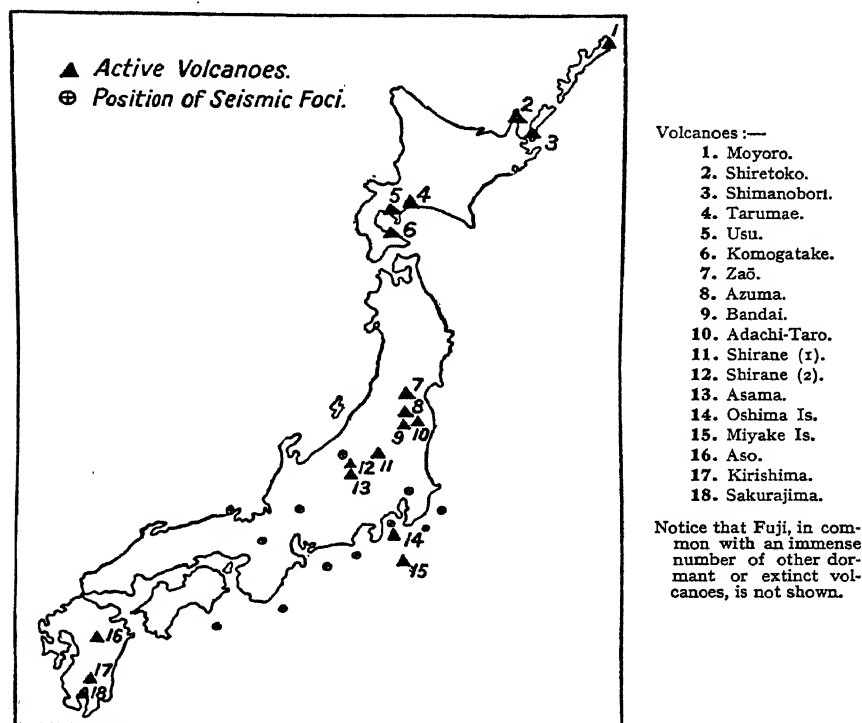


FIG. 298.—The active volcanoes and seismic foci of Japan.

Japan has been described as a land of volcanoes and earthquakes. It is well known that the portion of the Pacific Ocean which borders the southern and eastern shores of Japan is there extraordinarily deep; and that the high mountains of Japan are in close juxtaposition with one of the great ocean deeps. The principal Japanese earthquakes are associated with the

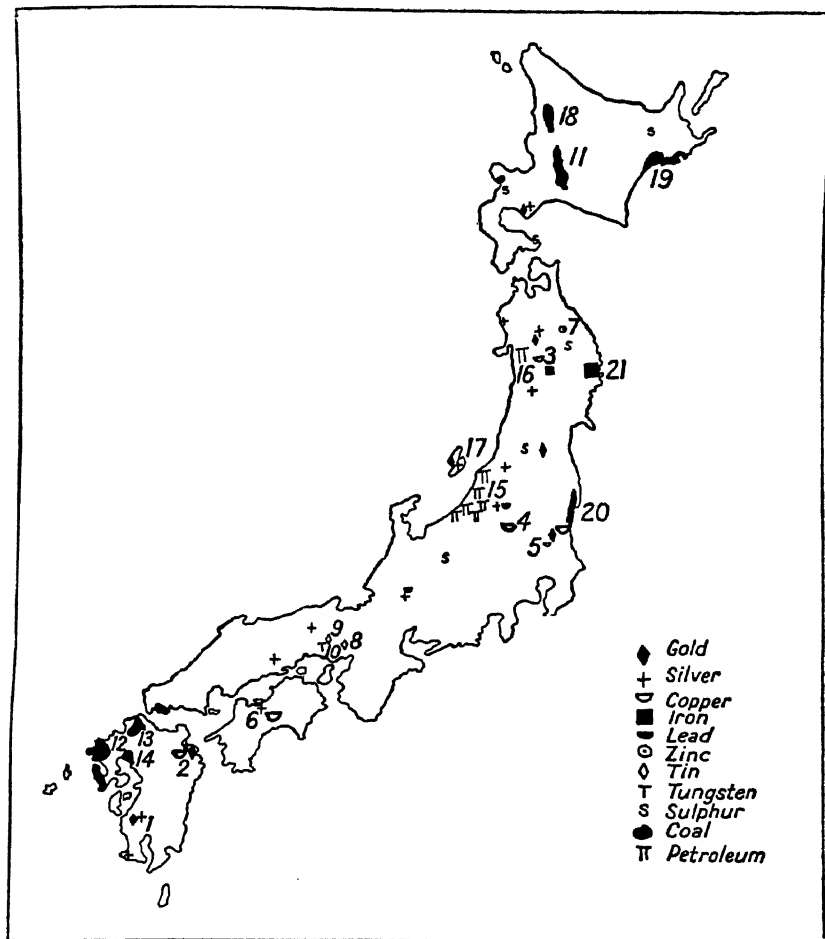
<sup>1</sup> For a brief account of the geology of Japan reference may be made to an official summary by the Imperial Geological Survey, *The Geology and Mineral Resources of the Japanese Empire* (Tokyo, 1926), which has been written to accompany the revised edition of the 'Geological Map of the Japanese Empire', scale 1/2,000,000.

resulting line of weakness ; the seismic foci are associated with the convex or outer side of the Japanese arc and only rarely with the inner or concave side. Some smaller shocks are also associated with volcanic eruptions, but it is a mistaken idea to suppose that the major quakes are caused in this way. On the contrary, volcanoes act as safety-valves, and places in their immediate vicinity are rarely visited by destructive shocks. Japan experiences on an average 1,500 shocks a year ; in Tokyo a sensible shock occurs on an average every three days. The prevalence of earthquakes has affected Japanese architecture from earliest times, the familiar bell tower (Kanetsukido), five-storied pagoda and temple gate (sammon) being built in such a way as to withstand the most severe shocks. Indeed, the principle of the five-storied pagoda is that of the duplex pendulum seismograph. The epicentres of Japanese earthquakes are frequently situated under the sea and deaths from tidal waves may exceed those from the earthquake itself. Amongst the more severe disasters may be noted that of A.D. 1498, when Tokaido was visited by a severe earthquake and 20,000 perished ; that of 1792 (Hizen and Higo), when 15,000 were killed or drowned ; that of 1844 (Shinano), when 12,000 died ; that of 1855 (Tokyo), 6,700 deaths ; that of 1891 (Mind-Owari), 7,300 deaths ; that of 1896, when tidal waves drowned over 27,000 in the Sanriku district. But in point of magnitude of damage inflicted on life and property the great earthquake of September 1st, 1923, which had its epicentre in the northern part of Sagami Bay, is without a rival in the world's history. The earthquake and the disastrous fire which followed razed Yokohama to the ground and destroyed half Tokyo, resulting in the destruction of 558,000 houses and causing the death of 91,344 people. It is perhaps only natural that Japan should have taken a foremost place in seismological investigations, but it is only comparatively recently that serious attention has been given to the construction of earthquake-resisting buildings. Light wooden buildings of the old type may be ideal in the country, but the danger of fire renders them totally unsuited for use in towns. There seems little doubt that the most suitable buildings are steel-framed buildings with rigid reinforced concrete walls.

Associated with vulcanicity in Japan are numerous mineral springs—at least 1,200 are known—mostly hot springs, many of which are radioactive. Numbers of popular health resorts are centred round the more famous of the hot springs.

On the whole Japan is not rich in minerals. Associated with the Tertiary sedimentary rocks are small coal-fields and oilfields and small seams of anthracite are found in Mesozoic rocks. Of

the metallic minerals copper is economically the most important and, after it, gold, silver and iron. The metallic minerals are



- |                                |                               |                         |
|--------------------------------|-------------------------------|-------------------------|
| 1. Kagoshima.                  | 8. Tajima (district).         | 15. Niigata (district). |
| 2. Saganoseki.                 | 9. Mino (district).           | 16. Akita (district).   |
| 3. Akita (district).           | 10. Gifu.                     | 17. Sado Island.        |
| 4. Ashio (Tochigi district).   | 11. Ishikari (district).      | 18. Uryu Coalfield.     |
| 5. Ibaraki (Hitachi district). | 12. Chikuzen (district).      | 19. Kushiro Coalfield.  |
| 6. Besshi (Ehime district).    | 13. Buzen (district).         | 20. Joban Coalfield.    |
| 7. Fukuoka.                    | 14. Miiki (Chikuhu district). | 21. Kamashi (iron).     |

FIG. 299.—The chief metalliferous deposits of Japan.

associated, in the main, either with the Tertiary volcanics or with the Archean and Palæozoic rocks.

**Coal.** Of the Tertiary coal-fields those in Kyushu and Hokkaido are the most extensive and valuable. In Honshu there

is a small field of inferior coal extending over Iwaki and Hitachi, but the fields of Northern Kyushu (in Chikugo, Chikuzen and Buzen) are believed to have about two-thirds of the reserves in Japan and the fields of Ishikari in Hokkaido one-sixth of the reserves. The output is about 30,000,000 tons per year (1919-32). The small and decreasing export (mainly of bunker coal from Nagasaki) is now more than balanced by an import. The coal-fields are not well situated, relative to the industrial centres; transport facilities are indifferent; workers not very efficient and wages high. These factors encourage the development of hydro-electric power and the import of foreign coal. Hakodate is the port of shipment for Hokkaido coal; Nagasaki is the bunkering port for Kyushu coal.

*Petroleum.* Japan's oil comes from two main areas, in the Echigo Province in the Niigata and Akita prefectures bordering the Japan Sea. Petroleum has been known to exist for a very long time, but it was not until about 1900 that the industry began to assume its modern activity. The peak of production was reached about 1912, and recent years have been marked by a steady decline in output (102,864,000 gallons in 1918 to about 68,000,000 recently<sup>1</sup>). Production is now only about 23 per cent. of requirements, hence a large import from California, the Dutch East Indies and Mexico, both of crude oil for refining in Japan and also of refined oils.

*Copper.* Copper is mined in several areas and Japan figures as the world's fifth or sixth largest producer. The ores are widespread, being found especially on the inner arc on the Japan Sea side, but also on both sides of the outer arc. As in most countries of the world, the production has varied considerably in recent years, falling from 108,000 tons in 1917 to 54,000 tons in 1921, since when it has risen gradually to 63,400 tons in 1926 and an average of rather over 70,000 tons in 1931-34. In the post-war depression the smaller producers dropped out and in recent years 75 per cent. of the output was from five mines: Ashi (Tochigi district), Besshi (Ehime district), Kosaka (Akita district), Hitachi (Ibaraki district) and Saganoseki (Ōita district).

Copper is the only metal which Japan produces in excess of home requirements, but the home demand has tended to increase and there is a marked tendency to export the surplus as finished articles—wire, rods, electrical machinery, etc. The cost of production of copper in Japan is high and the industry is protected by a heavy import duty on foreign copper.

*Gold and Silver.* Gold and silver not infrequently occur

<sup>1</sup> If the production from Taiwan is added, the production is about the same as twenty years ago.



together, or in veins of similar origin in sedimentary or volcanic rocks of Tertiary age. The principal gold-producing districts in the Japanese Empire are in the northern corner of Taiwan, the northern and south-western sections of Kyushu and in some north-eastern parts of Honshu. Lately the Ōita prefecture (especially Saganoseki) in Kyushu has become the leading centre. The gold, though worth 20,000,000 yen annually, is required in industry and medicine and there has been an import of bullion. Silver mines now worked are in Honshu, Kyushu and Hokkaido, but are absent in Taiwan. Noted districts are Akita (with Kosaka), Kagawa and Ibaraki (with Hitachi).

*Iron.* Japan is poor in iron ores: the reserve is estimated at only 5,000,000 tons, with a further 50,000,000 tons in Korea and Taiwan. The country needs at present about 2,000,000 tons of steel and 400,000 tons of pig annually; native ores supply only a small fraction—about 80,000 tons of the whole. The bulk is supplied by ores and manufactures imported from India, Manchuria, China and America. There has been an increase in home production recently, but nothing approaching the total required. In 1926 the only mine listed in the *Financial and Economic Annual of Japan* (1927) was Kamaishi (Iwate district), which produced 65,000 tons of pig-iron and 47,000 tons of steel.

Other minerals of importance in Japan include lead, zinc, tin, iron pyrites (for sulphuric acid), sulphur and mercury.

The following table shows the quantity and value of mineral production in Japan:

THE MINERAL PRODUCTION OF JAPAN

	Quantity. Thousands of Metric Tons.				Value. Millions of Yen.			
	1916-20.	1921-25.	1926-30.	1931-33.	1916-20.	1921-25.	1926-30.	1931-32.
Gold <sup>1</sup> . .	7,530	7,731	10,317	12,381 <sup>4</sup>	10.0	10.7	15.3	21.2
Silver <sup>2</sup> . .	184	120	155	166	10.5	5.7	5.7	4.4
Copper . .	89	59	73	73	106.8	42.8	54.7	36.4
Lead . .	9.6	3.1	3.5	5.2 <sup>4</sup>	3.3	0.9	0.9	0.8
Pig-iron . .	154	419	103	167	22.7	23.2	5.7	6.9
Steel . .	322	471	1,661 <sup>5</sup>	2,288 <sup>5</sup>	77.4	61.0	141.8 <sup>5</sup>	129.5 <sup>5</sup>
Iron pyrites	117	203	540	793 <sup>4</sup>	1.4	2.8	7.2	6.8
Coal . .	27,562	28,888	32,890	28,676	273.5	242.7	236.3	147.0
Sulphur . .	76	41	83	75 <sup>4</sup>	3.3	2.2	3.6	3.9
Petroleum <sup>3</sup>	88,563	68,014	66,000	75,500	28.5	22.7	14.5	9.1
Tin . .	—	—	1.3	1.6	—	—	—	—
Zinc (smelter)	—	—	20	27	—	—	—	—
Salt . .	—	—	630	547	—	—	—	—
Others . .	—	—	—	—	27.1	10.6	11.5	10.0
Total . .	—	—	—	—	547.0	425.8	496.2	376.0

<sup>1</sup> Thousands of grammes.<sup>2</sup> Millions of grammes.<sup>3</sup> Thousands of gallons.<sup>4</sup> 1931-32 only.<sup>5</sup> Output, including that produced from imported materials.

**Climate.** In general the climate, or more correctly the climates, of Japan are comparable with those of China but modified locally by Japan's insular position. As in China, there are very strong north-west winds in winter, and feebler south-east winds in summer.

*Winter Conditions.* The Japanese archipelago is warmer in winter than corresponding latitudes on the mainland and the country is divided roughly into two halves, a northern and a southern, by the January isotherm of  $32^{\circ}\text{F}$ . Although the west coast is exposed to the full force of the cold winds from the

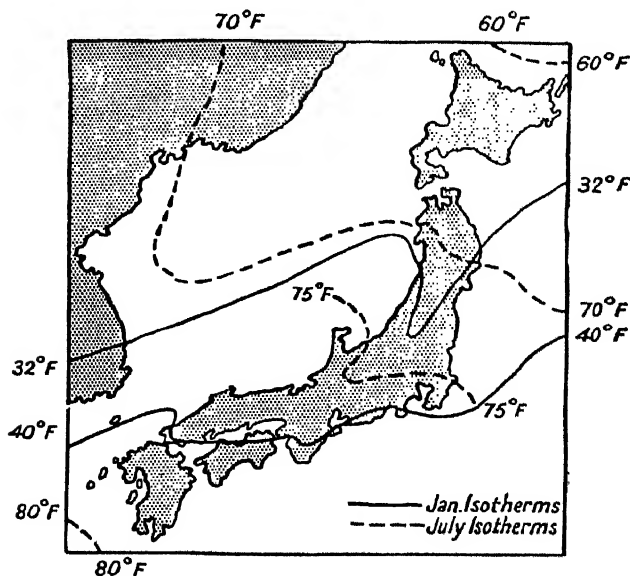


FIG. 300.—The climate of Japan—January and July isotherms.

More accurate data, expressed in Centigrade, are now available in Okada's *Climate of Japan*.

Asiatic mainland in winter, it is warmer than the east coast. The explanation of this surprising fact is found in the ocean currents bathing the Japanese shores. An important branch of the warm Kuro Siwo hugs the west coast, but the east coast is washed by the cold Okhotsk current from the north. Actually, it is the north-west winds that are warmed in crossing the warm waters which are in the main responsible for the warming effect on the west coast. There is naturally a great difference between the winter temperature in the north of the Japanese chain and the south. January temperatures in Sakhalin and the interior of Yezo are below  $15^{\circ}\text{F}$ ., whilst Southern Japan has mild winters with an average January temperature of over  $45^{\circ}$ . Over most

of Japan the winter is dry, though not so dry as in Northern China. In crossing the Japanese Sea the north-west winds, however, pick up a considerable amount of moisture and give a heavy precipitation, mainly in the form of snow, as they rise to cross the Japanese mountains. The east coast is comparatively rainless. In the north of Japan the air is, however, damp in winter and the raw cold contrasts with the dry cold of North

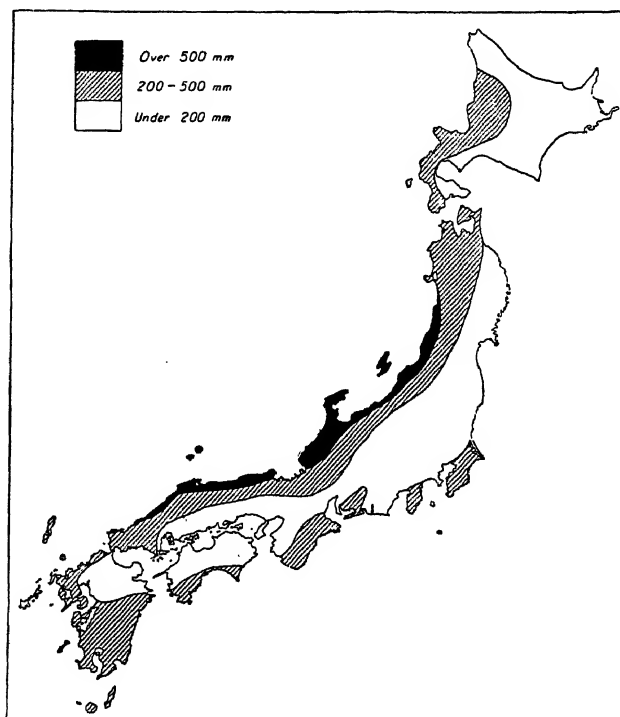


FIG. 301.—The winter rainfall of Japan (for the three months December, January and February).

Note.—25.4 mm. = 1 inch.

China. Some localities on the west coast of Japan have over 30 inches of rainfall in the three winter months—considerably greater than the precipitation in the summer months.

*Summer Conditions.* In July the temperatures decrease steadily from just below 80° F. in the south to 60° F. in the north of Yezo and in Sakhalin. The south-east monsoon commences to blow about May and reaches its height in August dying away in September and October. A curious feature of the climate of Japan, not fully explained, is that the maximum

rainfall does not coincide with the height of the monsoon. There are, instead, two rainfall maxima, one in June and one in September. In Japan proper (except Yezo) the first rainy season begins towards the middle of June and lasts till mid-July. Rain is more or less continuous, skies are overcast, the air is so damp that everything tends to become mouldy and the weather

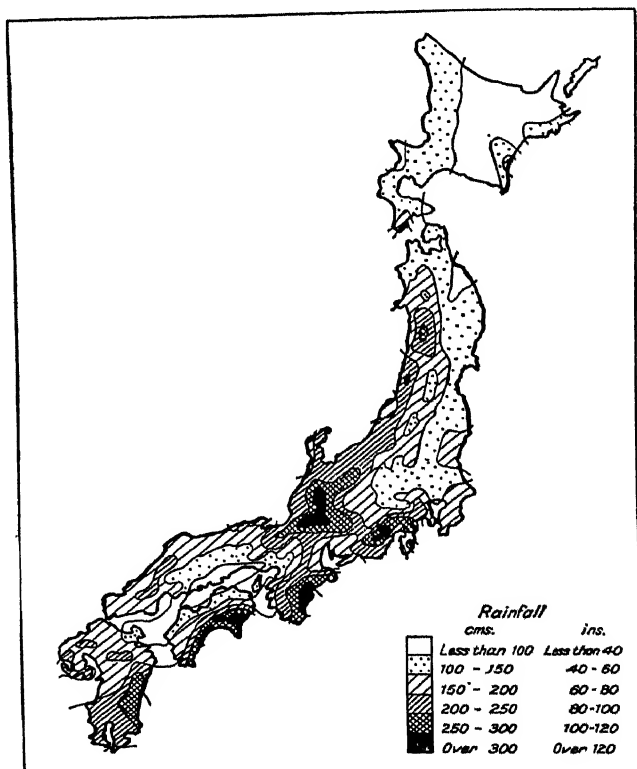


FIG. 302.—The annual rainfall of Japan.  
(Based on T. Okada, *The Climate of Japan*, Tokyo, 1931.)

is distinctly depressing. These early 'plum-rains' (Bai-u, so called because they come when the plums are getting ripe) are important in cultivation, for preparing the fields for the transplanting of the young plants. In most parts of Japan August is the hottest month, a feature definitely associated with the lessened rainfall (compare October in Rangoon, Calcutta and other Indian towns). The Bai-u may be due mainly to a series of shallow depressions, which are inconspicuous later when the

monsoon winds are strongest. The second rainfall maximum coming in September is largely due to the typhoons which, originating in the neighbourhood of the Philippine Islands, follow the course of the Kuro Siwo.

On the whole the rainfall of Japan is greatest along the south coast, where it may exceed 80 inches, and decreases northwards to less than 30 in Northern Yezo, but the west coast has a very wet strip due to the winter rains. Throughout the length of Japan the interior valleys (including that portion which constitutes the Inland Sea) are drier than either of the coasts.

**Climatic Regions.** In the first edition of this book it was remarked that the complicated topography of Japan resulted in rapid and marked local variations in climate but that four broad climatic regions could be distinguished. These four regions are shown in Fig. 303, and are based on the general characters of the climates.

- (a) *Southern Japan* or the sub-tropical region embraces the islands of Kyushu and Shikoku as well as of Honshu or Mainland as far north as  $35^{\circ}$  N.—that is, roughly, to the south of the main divide. This region includes all the country round the Inland Sea and the south coast. The winters are mild (January average about  $40^{\circ}$  or  $45^{\circ}$  F.) and dry, the summers hot (July average  $75^{\circ}$  F. to  $80^{\circ}$  F.). Although the winters are colder, it is perhaps better to include the Tokyo Plain in Southern Japan, since the winters are not so cold as to prevent winter sowing of crops.
- (b) *Eastern Japan*, embracing Honshu east of the main divide, north of  $35^{\circ}$  N., and including a small part of Southern Hokkaido. The winters are dry but cold, owing to the influence of the cold Okhotsk current. Over the northern half of the area the January temperature is below freezing point ( $25^{\circ}$ – $32^{\circ}$  F.), over the southern half about  $32^{\circ}$ – $38^{\circ}$  F.
- (c) *Western Japan*, embracing the whole of the west coast of Honshu and the southern portion of Hokkaido, and characterized by the winter precipitation and by cloudiness and fog. The north is considerably colder than the south.
- (d) *Northern Japan*, or strictly Northern Hokkaido, together with Sakhalin, has bitterly cold raw winters (below  $25^{\circ}$  F. in January) and rather cool summers (July average,  $66^{\circ}$ – $68^{\circ}$  F.). The same type of climate may be said to exist in the Alpine region in the heart of Honshu.

A somewhat different classification was proposed by M. E. M. Sanders,<sup>1</sup> distinguishing three major regions :

- (a) Southern—more than  $40^{\circ}$  F. in January.
- (b) Central—between  $32^{\circ}$  and  $40^{\circ}$  F. in January, subdivided into eastern and western.
- (c) Northern—below  $32^{\circ}$  F. in January, subdivided into the Hakodate type (Northern Honshu and Southern Hokkaido) and the Nemuro type (Northern Hokkaido).

The disadvantage of this scheme is that it separates the northern

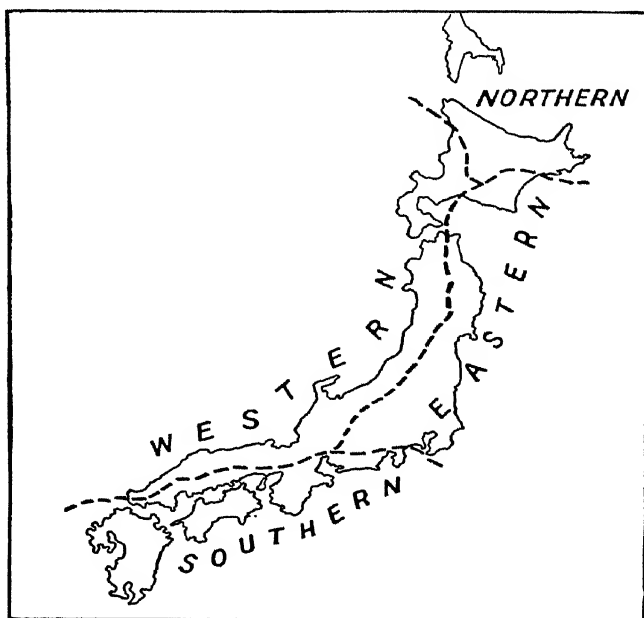


FIG. 303.—The main climatic regions of Japan.

and southern shores of the Inland Sea and does not correspond with main vegetation divisions.

According to Köppen's scheme (see Fig. 18A) Hokkaido, the extreme north and northern mountains of Honshu belong to his Dfc (sub-arctic, constantly moist), whilst the rest of Japan belongs to his Cfa (warm temperate, constantly moist).

Shortly after the publication of Thornthwaite's general scheme (as shown in Fig. 18B) an attempt was made to apply it, with

<sup>1</sup> *Monthly Weather Review*, July, 1920. See map in *Geographical Review*, Vol. XI, 1921, p. 146.

modifications, to Japan, but Thornthwaite did not agree with the results and drew up the detailed scheme shown in Fig. 304.

Apart from the fact that the division between AB'r and BC'r is placed somewhat to the west, this scheme shows a general correspondence with Fig. 303—Western Japan comprising AB'r

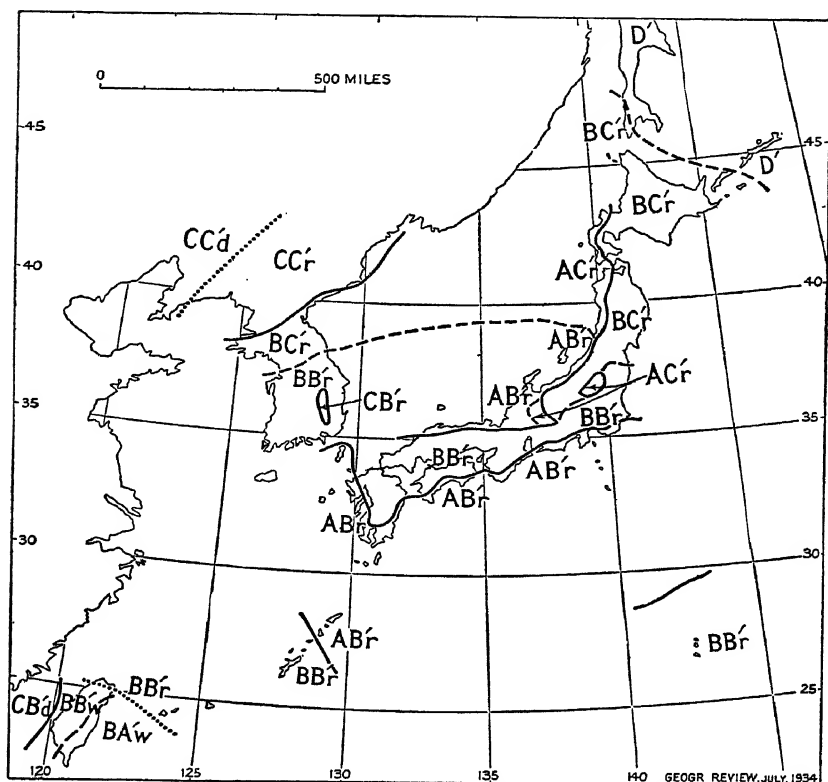


FIG. 304.—The climatic regions of Japan according to Thornthwaite's scheme. For explanation of lettering, see Fig. 18B.

and AC'r, Eastern BC'r, and Southern BB'r and AB'r. Hokkaido appears to be generously treated, and one feels doubtful of the justice of placing the Western and Southern coasts together.

**Natural Vegetation.** The natural vegetation of Japan is forest; as a result of the mountainous nature of the surface nearly half (48 per cent.) actually remains under forest. Indeed,

if one takes the Japanese Empire as a whole, nearly two-third of the surface is forest covered. Excluding the tropical forest of Formosa, to be noted later, the forests of Japan are of three types :

- (a) The sub-tropical forests, which occupy the climatic region of Southern Japan. They include broad-leave evergreens, such as the camphor tree (*Cinnamomum camphora*), evergreen oaks (*Quercus abuta*) and *Pasani*

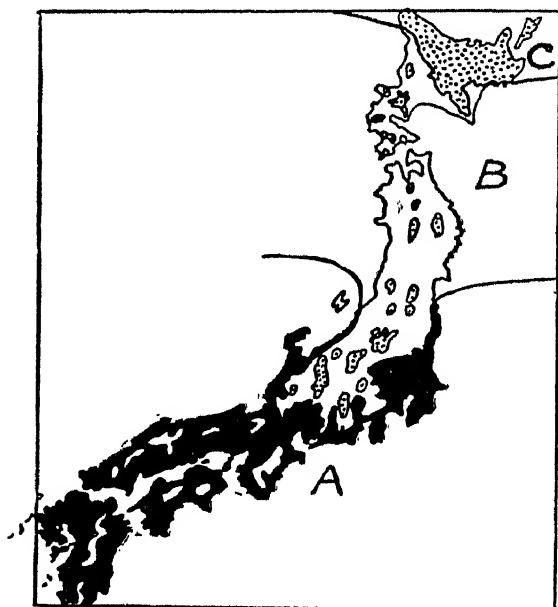


FIG. 305.—Map showing the forest and soil belts of Japan.

- A. The Zone of Sub-Tropical Forests with red and yellow soils.  
 B. The Zone of Temperate Forests with brown forest soils.  
 C. The Zone of Boreal Forests with podsolized, partly podsolized, and bog soils.

(After O. N. Mikhailovska.)

*cupidata*, as well as deciduous oaks (*Q. serrata* and *Q. glandulifera*) and several species of pines.

- (b) The temperate forests, which occupy the climatic region of Eastern and Western Japan, and which are mixed coniferous and deciduous forests. Conifers include *Cryptomeria japonica*, *Chamaecyparis obtusa*, *C. pisifera*, *Tsuga sieboldii*, *Abies firma* and several species of pine. The deciduous trees include oaks, chestnuts, maples, *Zelkova serrata*, *Fagus sylvatica* and *Magnolia*. These forests are economically the most important in Japan and are now found especially on the mountain slope



overlooking the Sea of Japan on the one hand and the Pacific on the other.

- (c) The cold temperate forests which cover most of Hokkaido and Karafuto and occur also above 4,000 or 5,000 feet on the mountains of Honshu. They are coniferous forests and the trees include *Abies veitchii*, *A. sachalinensis*, *Picea jezoensis*, *Larix kurilensis* and also the 'creeping-pines' (*Pinus pumila*) of the high mountains of Honshu.

Recent investigations have shown a close correlation between these vegetation belts and soil types.

- (a) Yellow and red soils occur in the sub-tropical forests.

- (b) Brown and slightly podsolized soils occur in the temperate forests.

- (c) Podsolis occur in the cold temperate or boreal forests.

In Japan proper there are roughly 50,000,000 acres of forest—roughly 24,000,000 acres being privately owned, 18,500,000 State owned, and about 3,000,000 owned by the Imperial Household. Much attention has been paid in recent years to scientific forestry, and Japan's forests form one of her great natural assets. In recent years the forests yielded 500,000,000 cubic feet of timber, worth 75,000,000 yen, also faggots worth 50,000,000 yen, bamboo (3,000,000 yen) and various by-products (especially charcoal) worth 100,000,000 yen. Of the timber trees there are three of special importance. Sugi (*Cryptomeria japonica*) represents over a quarter of the total quantity of timber and over 40 per cent. of the value; pine more than a fifth of the quantity and of the value; Hinoki (*Chamaecyparis obtusa*) only 4 per cent. of the quantity, but over 9 per cent. of the value.

Despite the area and importance of her forests, Japan figures on the balance as a timber importer.

**Agriculture in Japan.** From time immemorial rice cultivation has been the prime occupation in Japan, and the country was essentially an agricultural one. Within the last half-century changes of the most far-reaching character have taken place. It is unnecessary to stress the westernization and industrialization of Japan—these are too familiar to require emphasis. The point to be stressed is the rapid growth of the population which from 1720 to 1840 had remained practically constant at 30,000,000, but which, by 1930, had risen to 64,450,000. From a self-supporting country Japan has become one dependent upon imported foodstuffs and raw materials and one in which the population problem is extremely acute. The position may be judged by comparison with England and Wales. There are in Japan (January 1st, 1932) 14·2 million acres of arable land (or 19·0

including pasture, gardens and townlands) to support 64,450,000 people; in England and Wales 9.3 million acres of arable land (or 25.1 million including permanent pasture) to support 39,950,000 people. Taking arable land alone, there is 1 acre per 4.5 people in Japan, 1 acre per 4.3 in England and Wales; taking arable and pasture land together, there is 1 acre per 3.3 people in Japan 1 acre per 1.6 people in England and Wales. Yet in England and Wales only about 30 per cent. of the foodstuffs required are produced at home. Even allowing for a lower standard of living the utter dependence of Japan on food supplies from outside the country is at once apparent. The Japanese farming families number about  $5\frac{1}{2}$  millions, so that the average size of a farm is only a little over  $2\frac{1}{2}$  acres. Even in Hokkaido the average area per family is only 10 to 12 acres.

Cultivation is chiefly done by human labour, with rude and simple implements; the farmer often has a single ox or horse to assist him, but rarely a team.<sup>1</sup> It is only in Hokkaido that American farm implements are used. Much that has been said as to Chinese agriculture applies also to Japan; human excreta, farmyard manure, fish guano, wood ash and rice bran are, or were, the chief types of manure, but Japan differs from China in the now extensive use of Chile nitrate and chemical manures which were imported to the extent of over 200,000,000 yers annually until the home industry developed in the last few years. Phosphate manures are manufactured from phosphatic rocks imported from Christmas Island and the islands of Oceania.

In 1872, when the feudal system of government was peacefully replaced by the Imperial régime, a great change was effected in the land system. Before that date the feudal lords and their vassals owned the land and let it to the farmers. In the peaceful revolution of 1872 the land passed into the possession of the tenants. About three-fifths of the arable land is now cultivated by peasant proprietors. Recent years have seen the rise of a 'nouveaux riches' class of landowners, perhaps less considerate to their tenants than the old feudal lords. The lot of the Japanese farmer leaves much to be desired and there is consequently a drift of the younger generation to the towns. In order to economize valuable land villages are often built on steep hill-sides and terracing is practised wherever possible. Nevertheless, great waste results from excessive fragmentation of holdings (compare India) and since 1900 much work has been done towards the adjusting of farms and making the paddy-fields larger and more economic to work. It is estimated that the increase in

<sup>1</sup> There are about 1,100,000 horses and 1,100,000 horned cattle employed in tillage.

yield will be 15 per cent. Between  $1\frac{1}{2}$  and 2 million acres have already been adjusted. Apart from gains from readjustment, it is claimed that in Japan proper 5,000,000 acres of waste land can be reclaimed for cultivation, of which 2,500,000 acres may theoretically be converted into paddy-fields—permitting an addition of 50 per cent. to the present yield of rice in Japan. But such increases in the home-grown food supply can only be brought about by expenditure of much time and money<sup>1</sup>; hence the importance to Japan of the produce of the agricultural tracts of Manchuria.

Rice is, *par excellence*, the staple farm product of Japan and occupies more than half the total area under cultivation. The cultivation is almost entirely in irrigated paddy-fields, the production in ordinary dry fields being insignificant. As a second crop barley, rape, beans and peas are grown. The principal crops in upland farms are wheat, barley, rye, buckwheat, sweet potatoes, as well as vegetables, fruits, etc. Amongst the crops of comparatively recent introduction are oats, flax, onions, cabbage, asparagus, as well as, surprising as it may seem from the association of Japan with cherry blossom, apples, cherries and small fruit. Tobacco growing is a Government monopoly. Cotton has almost gone out of cultivation and so has indigo. The clear-cut distinction between paddy-fields and fields for other crops is recognized in the official classification of arable land into 'rice-fields' and 'fields for other cereals',<sup>2</sup> in addition to which there are 'pastures' and 'plains' (Genya). The latter are regions with an inferior soil situated at high levels, naturally covered with a growth of bushes but used for raising weeds for manure, growing fodder (one-third of whole) or for pasture.

	Area in Hectares. <sup>1</sup>		Acres.
	Jan. 1, 1918.	Jan. 1, 1927.	Jan. 1, 1934.
Rice fields . . . . .	2,887,778	2,946,568	7,778,773
Fields for other cereals . .	2,402,003	2,761,469	6,793,591
Pastures . . . . .	43,054	139,752	—
Plains . . . . .	1,296,637	1,565,012	4,724,681

<sup>1</sup> *Financial and Economic Annual of Japan.*

This table is inserted to illustrate the efforts being made

<sup>1</sup> And many experts believe that such increases are *not* possible.

<sup>2</sup> The first is the 'ha', or wet cultivation, the second the 'hata', or dry cultivation.

by the Japanese to increase the cultivated area within the home area. (Note: 1 hectare = 2.471 acres.)

For irrigation of paddy-fields rivers supply water for over 64 per cent., reservoirs for 21 per cent. and old-fashioned primitive methods of irrigation supply water for most of the remainder. The raising of winter crops—naked barley, wheat, rape and various millets—is by no means universal on the paddy lands. In recent years not only has the acreage under rice steadily increased but so has the yield. In round figures the annual yield of rice is 250,000,000 bushels, which is about 40,000,000 bushels less than the domestic consumption, including that required for the manufacture of saké.

The chief secondary grains are rye (in recent years, 1930-33 about 1,350,000 acres), wheat (1,225,000 acres) and barley (930,000 acres). Curiously enough, there has been in the last ten years a steady decrease in acreage and yield under rye and barley, but a decrease in wheat has recently been turned into a small increase. One of the hopes for improving the Japanese food position is a change of diet from rice to wheat, but the tendency in agriculture in this direction is slow. The soy or soya bean is used, not only for human consumption, but also to make soy—essential in Japanese cooking—soup and *tofu*—a bean curd with the consistency of cream cheese and a popular and important article of diet.<sup>1</sup>

Tea occupies a decreasing acreage—now under 40,000 hectares or 100,000 acres—but there are over 1,000,000 small manufactories. Nearly all the tea now produced is green tea, especially the variety known as Sencha. The tea gardens are in South Japan.

Special interest attaches to the sericulture of Japan. The position occupied by sericulture in Japanese agriculture bears a strong similarity to that taken by poultry-farming in mixed farms of Europe and America. It is carried on by farmers as an adjunct to crop-raising, the farmer's wife and children supplying much of the skilled labour necessary. The female of *Bombyx mori* is a sluggish moth which lays about 500 eggs and then dies. The minute eggs are covered with a gelatinous material and are usually washed before being incubated. For incubation the eggs are kept for eleven months at an even temperature of 64° F. The worms are about one-twelfth inch long when hatched, and are born with ravenous appetites. They feed for four days before becoming torpid, bursting their skins and

<sup>1</sup> For details of the distribution of the various crops see the Agricultural Atlas of Japan, Imperial Agricultural Association, 1928, and R. B. Hall, *Econ. Geog.*, Vol. XI, 1935, pp. 130-47.

starting afresh. During their brief life of seven weeks the skin is shed four times. Although the worms themselves can be, and are, kept under glass, a genial spring is still of very great importance in providing a continuous supply of fresh mulberry leaves. Each pound of eggs will require about 10 tons of leaves, so that every spring the silkworms of Japan (including Korea) consume 4,000,000 tons of fresh young mulberry leaves, thirty or forty trees being needed to yield 1 ton of leaves. Hence mulberry trees occupy over 1,100,000 acres. If the worms themselves are kept out in the open a minimum average temperature of at least 60° from April onwards is required. When fully grown each caterpillar should be placed by hand on clean straw or twigs in a suitable position. It is unnecessary to emphasize further the skill and patience required at every stage in the production of raw silk. Not only must labour be abundant and cheap, but inherited delicacy of manipulation is virtually a necessity. The fact that silkworm rearing is essentially dependent upon skilled manual labour has been a vital factor in the prosperity of this industry in Japan, as it has baffled the inventive ingenuity of Western nations to devise labour-saving substitutes for skilled human manipulation. The discovery that the hatching season may be freely regulated by keeping the eggs in cool places has made it possible to undertake summer and autumn rearing and to double the output of cocoons. At present, since sericulture has seldom succeeded when conducted on a large scale, it seems specially designed to assist the otherwise hard-driven small farmer. Lack of uniformity as to the quality of the filaments is the chief drawback of the present domestic system of sericulture. The production of cocoons in Japan (including Korea) in 1921-25 averaged 260,000 metric tons<sup>1</sup> out of a world's total (excluding China) of 350,000 metric tons. Amazing progress has been made in Japan in recent years. The importance of the summer crop is shown by the following table<sup>2</sup>:

	Spring Eggs.	Spring Cocoons.	Autumn Eggs.	Autumn Cocoons.
	Per cent.	Per cent.	Per cent.	Per cent.
1909-13 . . . .	52·5	60	47·5	40
1925 . . . . .	43	48	57	52
1927 . . . . .	40·5	50·8	59·5	49·2

<sup>1</sup> 1930, 400,000; 1933, 380,000.

<sup>2</sup> Later details are not given precisely in this form, but the proportions remain substantially the same.

Whilst the yield of silk from spring cocoons is thus still greater than from autumn cocoons, more than half Japan's silk is now obtained from the later crop, safe from the vagaries of spring. There has also been a remarkable increase of yield of silk per unit weight of eggs incubated :

1909-13. 1 lb. of eggs yielded 1,071 lb. of spring cocoons or 796 lb. of autumn cocoons.

1925. 1 lb. of eggs yielded 2,018 lb. of spring cocoons or 1,650 lb. of autumn cocoons.

Roughly 1 lb. of raw silk is obtained from 10 to 11 lb. of cocoons. It is scarcely necessary to add that there is now very little hand reeling of silk.

Owing to the lack of pasturage Japan is not a great stock-breeding country. Among horses native breeds have largely given place to cross-breds, stallions being imported from Australia and England. Similarly the native horned cattle are being replaced by cross-breds. Devon, Ayrshire and Shorthorn cattle were imported and, more recently, Holstein and Simmenthal. The increased demand for dairy produce has given rise to the breeding of dairy cows. Japan has practically no sheep, except on some Government farms. Sheep, goats and pigs are all, however, being bred in increasing numbers. Between 1916 and 1926 sheep increased in numbers from 3,370 to 17,901, and in 1932 totalled over 34,000 ; goats, 109,353 to 179,089 (325,000 in 1932) ; pigs, from 327,891 to 621,466 (1,600,000 in 1932).

**Fisheries.** The continental shelf around Japan is one of the great fishing-grounds of the world and fish forms an important supplement to the diet of rice and vegetables. The Buddhist aversion to a meat diet has tended to confirm the importance of the fisheries. No less than 400,000 boats, mostly small open craft, are engaged on the Japanese fishing-grounds, but steam trawlers are gradually coming into use. Nearly 1,500,000 people are engaged in the fishing industry, including 500,000 women and children. The *per capita* catch is only about one-fifteenth of that in England, though the total value, which has fluctuated between 235,000,000 and 275,000,000 yen in recent years (1919-34), is greater than that of British fisheries. The chief food fishes include herring, sardine and anchovy, mackerel, bonito, tunny, yellow tail, sea bream, cuttle-fish, flatfish, squid and octopus, lobsters, prawns, etc. In addition to the food fish, secondary products are worth between 150 and 200 million yen annually ; fish guano, dried bonito, dried cuttle-fish and squid being some of the chief items. The cuttle-fish, squid and octopus are increasingly consumed at home and in China ; sea-cucumber or *bêche-de-mer* is found round the coasts of Honshu and in Hokkaido

and is largely exported to China, together with sharks' fins. Sea weeds are collected and dried and sold as a relish for soup, fish or rice. Seaweed is also turned into a kind of jelly as well as being used in the manufacture of isinglass. Japan has a unique industry in the breeding of pearl oysters and of 'culture pearls'. Grains of mother-of-pearl are introduced between the shells of three-year-old oysters, causing the oyster to secrete a pearl round the irritating body. In four years a pearl of considerable size is formed and is indistinguishable from a pearl naturally formed. These 'culture pearls' are from Toba (Shima) in the Bay of Ago, where Mr. Mikimoto has the monopoly.

**Industry.**<sup>1</sup> The industrial revolution in Japan—the replacement of household industry by the factory system and of hand-work by machines—made the most marked strides after the war with China in 1894-95. The change was most conspicuous in the spinning industries.

TABLE SHOWING THE MORE IMPORTANT JAPANESE INDUSTRIES <sup>2</sup>

	No. of Factories.	No. of Operatives.	Value of Output. Million Yen.		
	1925.	1925.	1919.	1925.	1932.
Cotton spinning . . . .	189	210,997	760.5	781.4	459.9
Silk spinning . . . .	32	29,025	43.2	62.0	53.8
Hemp spinning . . . .	22	7,482	16.4	24.6	14.9
Silk fabrics . . . .	4,092	{ —	404.9	242.8	1,153.5
Silk and cotton mixed . .			45.5	29.8	
Cotton fabrics . . . .	4,694	—	790.0	703.0	
Hemp fabrics . . . .	81	—	12.9	28.4	
Woollen fabrics . . . .	507	—	121.9	185.0	
Japanese paper . . . .	—	30,190 <sup>2</sup>	79.6	53.0	132.2
European paper . . . .	108	—	116.6	119.7	
Matches . . . .	33 <sup>1</sup>	930 <sup>3</sup>	39.7	17.0	—
Porcelain and earthenware	7,496	43,771	29.3	78.2	65.3
Matting, etc., for export .	—	—	31.6	29.0	15.1
Crude camphor and cam-	2,236	—	1.7	4.6	—
phor oil . . . .					
Lacquer ware . . . .	—	9,357 <sup>3</sup>	24.1	30.9	26.6
Straw-plaiting, etc. . . .	—	82,940 <sup>3</sup>	18.6	12.4	—
Brushes . . . .	—	671 <sup>3</sup>	11.2	5.4	—
Vegetable oil . . . .	—	20,521 <sup>3</sup>	61.8	45.4	31.9

<sup>1</sup> 185 in 1919.<sup>2</sup> 20,419 in 1919.<sup>3</sup> Families.(Figures from *Financial and Economic Annual of Japan*.)

<sup>1</sup> See *The Industry and Trade of Japan*, S. Uyehara (London: King, 926).

<sup>2</sup> Late years have not been substituted in this table as factories are now classified differently and world conditions are still abnormal.

The Russo-Japanese War (1904-5) brought into prominence the chemical industries, whilst during the great European War all Japanese industries were stimulated into great activity and reached a state of amazing prosperity, Japanese goods obtaining a firm hold on all Eastern markets. In the first instance a slavish imitator of Western ideas, Japan has long since shown her own creative genius in the field of industry and can no longer be regarded as an imitator. The appalling disaster of 1923 very seriously dislocated Japan's industry and trade: Yokohama silk mercers migrated temporarily to Kobe and Osaka and conditions in 1924-26 cannot be regarded as normal. In 1921, at the height of the post-war boom, there were 87,398 factories in Japan with more than five operatives, 71,321 being run by motive power, the remainder by manual power. Employees, amongst whom women outnumbered men, totalled nearly 1,700,000. There was a great decline in the years which followed, but in 1926 numbers had recovered to 51,906 factories with 1,875,000 employees. From that time to the present despite the great world depression, there has been a steady increase in the number of factories (only 15 per cent. are now run by manual power) and an increase in output but a drop in the number of employees.

*Hydro-electric Power.* In a mountainous country such as Japan, with a good rainfall and numerous swift streams and at the same time a country deficient in coal, it is not surprising that extensive use should have been made of water-power resources. The development dates from 1891 and the war with China in 1894-95 acted as a spur. Researches conducted by the Government (1923) estimate the total power which can be developed at 6,415,000 h.p. in drought, 14,093,000 h.p. at normal level, and the yearly average, 11,933,000 h.p. The electrical undertakings in operation at the end of 1924 numbered 4,472, developing 2,230,000 kilowatts, of which 1,470,000 kw. represented water-power. By 1933 this had increased to 67,400 developing 5,000,000 kw., of which 3,110,000 kw. represented water-power. In addition, many large schemes were in course of construction. There are thus, theoretically, immense reserves of power awaiting development. Of rivers draining to the Japan Sea the following are the most important: Shinano, Arakawa (each capable of developing over half a million horse-power) Jintsu, Kurobe, Shō, Mogami, Hime, Kuzuryu, Joganji and Tetori. Of those draining into the Pacific Ocean, the Kiso Tenryu (both over 500,000 h.p.), Fuji, Tone, Oh-i, Kitakami, Abukuma and Kino are the chief. It will be noted that these rivers are all conveniently situated for the chief power-using





the factory units are small and the figures given above show that the average number of workers per factory is only about thirty. On the other hand, it is not to be denied that Japanese competition is keenly felt in all the world's markets and that the standard of living in the country is rising.

*The Manufacturing Regions of Japan.* Japan's manufacturing belt extends, as shown in Fig. 307, from Nagasaki and northern Kyushu and the western entrance to Setouchi (the Inland Sea), along both shores of that sea and to the Tokyo Plain in the east.

There are four main foci within this belt :

- (1) The Tokyo Industrial Region, roughly coincident with

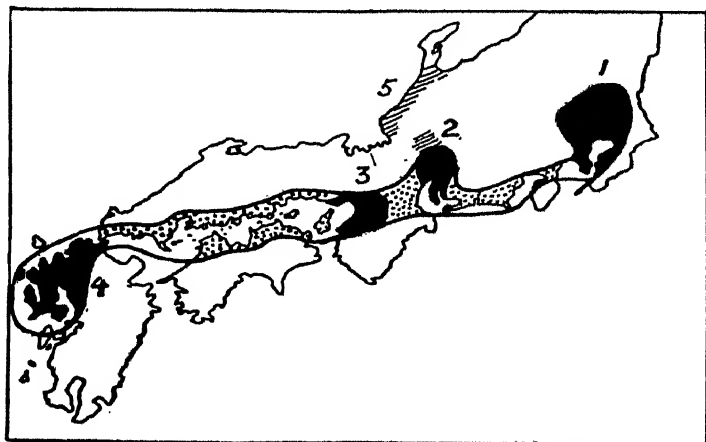


FIG. 307.—The manufacturing belt of Japan.  
(After Trewartha.)

The four main foci are shown in solid black ; the numbers correspond with the regions listed in the text  
The area marked 5 is that important for silk-weaving.

the Kwantō or Tokyo Plain and centring around Tokyo and Yokohama. A great variety of manufactures are carried on here, and this is pre-eminently the region of small industries and small factories.

- (2) The Ise Bay or Nagoya Industrial Region, with its main centre at Nagoya, is concerned especially with the reeling of raw silk, cotton and porcelain.
- (3) The Kobe-Osaka Region, at the eastern end of the Inland Sea, produces a third of all the manufactured goods of Japan, Osaka being the great cotton centre, and having many other industries, notably the manufacture of small metal goods and machinery.
- (4) The Northern Kyushu Region, situated on or near the

coalfields of Kyushu and conveniently placed for the import of iron ore or pig-iron from Manchuria, is associated with the heavy industries; the textile industry is unimportant.

*The Textile Industries.* The history of the Japanese cotton industry is one of continuous expansion. From 1912 to 1934 not a single year has passed without an increase in the number of spinning mills and spindles—from 147 mills with 2½ million spindles in 1912 to 267 mills with over 9 million spindles in 1933. In addition there are the Japanese mills in China—over 2 million spindles—(especially Shanghai) and in Manchuria. Thus Japan ranks as seventh among the cotton-spinning countries of the world. The development in Japan is all the more remarkable as Japan has had to depend upon foreign supplies of raw material and machinery. The raw cotton comes from India, the United States, China and Egypt, the first two supplying 80 to 90 per cent. of the total. Of recent years there has been a marked tendency to the spinning of finer counts with a consequent rise in imports from the United States and a lower or stationary demand for the coarse Indian cotton. Cotton-weaving is a somewhat later development but is now as important as the spinning. The textiles—both cotton and silk—intended for domestic consumption are made in widths often of only one foot and the specialization for export is a noteworthy feature of Japanese industry. In this, too, there is a marked flexibility. Until about 1924 China took half of Japan's export. In the next eight years the value of the goods purchased by China fell to one-fifth of the 1924 total, whilst production within China trebled. Japan sought new markets and found them in India, the Dutch East Indies, South Africa and the Near East. But India was already making her own coarse cloths, and so Japan specialized in the finer materials, thus clashing directly with Lancashire's exports. During the great depression the Japanese industry went ahead unchecked: the output of cotton cloth leapt from 1,500,000,000 square yards in 1932 to nearly 1,800,000,000 in 1934.

The lack of raw materials, machinery and skilled labour retarded the development of a woollen industry, although it was started as long ago as 1876 by a Government factory. Again, the World War provided the necessary stimulus—not only because of the demand for woollen cloths for uniforms but because of the disappearance of the light fabrics previously made in France and Germany, especially for Far Eastern markets. The export of these light fabrics from Japan first appears in returns for the year 1905: imports appear for the last time in 1917.

Japanese production of rayon or artificial silk started in 1919 and the output has increased by at least 30 per cent. every year since. The really phenomenal rise was from 90 million lb. in 1933 to over 140 million in 1934, so that Japan is second to the United States only in this industry. Yet the industry had to fight the opposition of the silk manufacturers and the prejudice of the purchasing public. Both have been overcome and the industry is located in famous silk centres such as Kanazawa and Fukui on the Japan Sea Littoral, at Kyoto and in the northern part of the Kwanto industrial region. Even here Japan has another industry dependent mainly on imported raw materials—wood-pulp from Canada—against a small quantity of home wood-pulp from Karafuto. But Japan has introduced soft shiny rayon for the first time to such poverty-bound but inherent lovers of the luxurious as the Abyssinians, the natives of the Congo and the 'savages' of Borneo.

The silk industry occupies a position different from that of cotton. It is not an industry imported from the West but one indigenous to the country. The rearing of silkworms is a branch of agriculture, the reeling of silk is a simple mechanical process requiring skill and patience but little power and no complicated machinery. The product, raw silk, is in reality a raw material—the one raw material exported in large quantity from Japan. As much as 80 per cent. of the silk produced may in some years be exported—especially to the United States. In the silk-weaving industry a distinction must be made between the heavy and often costly fabrics—satins, silk crêpes and brocades—for the domestic market, which are produced generally by women on hand-machines, and the cheaper, lighter fabrics made almost exclusively for export. The thin 'Jap silk' and 'Fuji' so well known abroad are rarely used in the country itself. Although silk spinning and the weaving of such fabrics are carried on as a subsidiary business by the cotton mills, the silk-weaving business is also a semi-domestic one and carried on largely *outside* the main industrial belt. Thus the Fukui and Ishikawa prefectures, along the north coast, produce two-thirds of the output.

*The Paper Industry.* Japan from very early times has produced a variety of fine hand-made papers, but the modern factory industry dates from 1872, and is now one of the major ones of the country. The output is approaching a million tons of paper and paperboard. The pulp is produced in Karafuto and Hokkaido, but is supplemented by an import from Canada and the United States.

*The Chemical and Associated Industries.* The chemical industry has been described as the 'most polygamous of all industries'

in that its products are required by nearly all other industries. Thus the products are very varied: the availability of cheap hydro-electric power favours the electro-chemical production of fertilizers, calcium carbide, caustic soda, bleaching powder, electrolytic copper, etc. The extensive production of glass and glassware, dyestuffs, matches, paper, celluloid, soaps, etc., is to be regarded in part as an offshoot of the chemical industries.

*The Iron and Steel and Engineering Industries.* The iron and steel industry is small in comparison with other manufacturing countries—the output of pig-iron from domestic ores is only one-thirtieth of the annual requirements, though the output of pig-iron from imported ores (especially from Manchuria and China) reaches two-thirds of the requirements and is now over 1,000,000 tons. Most of the steel required is produced within the country from the pig thus produced or from imported pig. There are numerous iron-using industries—including new electrical machinery, shipbuilding, locomotive works, and locomotives. The manufacture of toys has changed from a domestic to a factory industry: bicycles once imported in large numbers are now exported in huge numbers to China, the South Sea Islands and many Asiatic countries. From 1931 to 1932 the export doubled, and again from 1932 to 1933.

*Other Industries.* An old and important industry is the manufacture of porcelain and pottery. Japanese lacquer is also well known in most parts of the world. Cement, brewing (of both beer and saké), flour milling, sugar refining, preparation of oils, fats and waxes, rubber goods, leather goods, mats, brushes and bamboo are all significant. Hokkaido has developed an interesting production of peppermint.

**The Population of Japan.** 'Japan labours with a perplexing problem. Her population is increasing at a rate so rapid that it threatens soon to pass beyond the productive capacity of the nation's soil and resources. Pressure of the population on subsistence is the basis of the present economic inrest within the country. Search for relief is the keynote of Japan's domestic and foreign politics.'<sup>1</sup> The present rapid increase, as already noted, dates from the 'sixties and 'seventies of last century, but it is only within the last few years that the position has become serious. In 1925 the net increase for Japan proper was 875,000; in 1926 over 900,000; in 1927 over a million. In the next four years the annual increase averaged nearly 900,000; in 1932 it again exceeded a million. The net increase has been 1·2 per cent. per annum and at the present

<sup>1</sup> J. E. Orchard, 'The Pressure of Population in Japan', *Geog. Review*, vol. XVIII, July, 1928, pp. 374-401.



FIG. 308.—The towns and cities of Japan (population in 1920).

Compare the list given on page 614 with populations in 1930.

1. Tokyo.
2. Osaka.
3. Nagoya.
4. Okazaki.
5. Toyohashi.
6. Aikita.
7. Hiroaki.
8. Amori.
9. Yawata.
10. Imabaru.
11. Matsuyama.
12. Fukui.
13. Kurume.
14. Kokura.
15. Wakamatsu.
16. Moji.
17. Fukuoka.
18. Fukushima.
19. Wakamatsu.
20. Gifu.
21. Ogaki.
22. Maebashi.
23. Takasaki.
24. Hiroshima.
25. Kure.
26. Onomichi.
27. Fukuyama.
28. Himeji.
29. Akashi.
30. Kobe.
31. Mito.
32. Kanazawa.
33. Morioka.
34. Takamatsu.
35. Marugame.
36. Kagoshima.
37. Yokohama.
38. Yokosuka.
39. Kochi.
40. Kumamoto.

41. Otsu.
42. Kyoto.
43. Sendai.
44. Uji-Yamada.
45. Tsu.
46. Yokkaichi.
47. Nagano.
48. Matsumoto.
49. Nagasaki.
50. Sasebo.
51. Nara.
52. Niigata.
53. Nagaoaka.
54. Takata.
55. Oita.
56. Okayama.
57. Sakai.
58. Amagasaki.
59. Saga.
60. Matsuy.
61. Shizuoka.
62. Hamamatsu.
63. Utsunomiya.
64. Hachioji.
65. Tottori.
66. Toyama.
67. Takao.
68. Wakayama.
69. Yamagata.
70. Yonezawa.
71. Tokuyama.
72. Shimonsaki.
73. Kofu.
74. Asahigawa.
75. Hakodate.
76. Kushiro.
77. Muroran.
78. Otaru.
79. Sapporo.

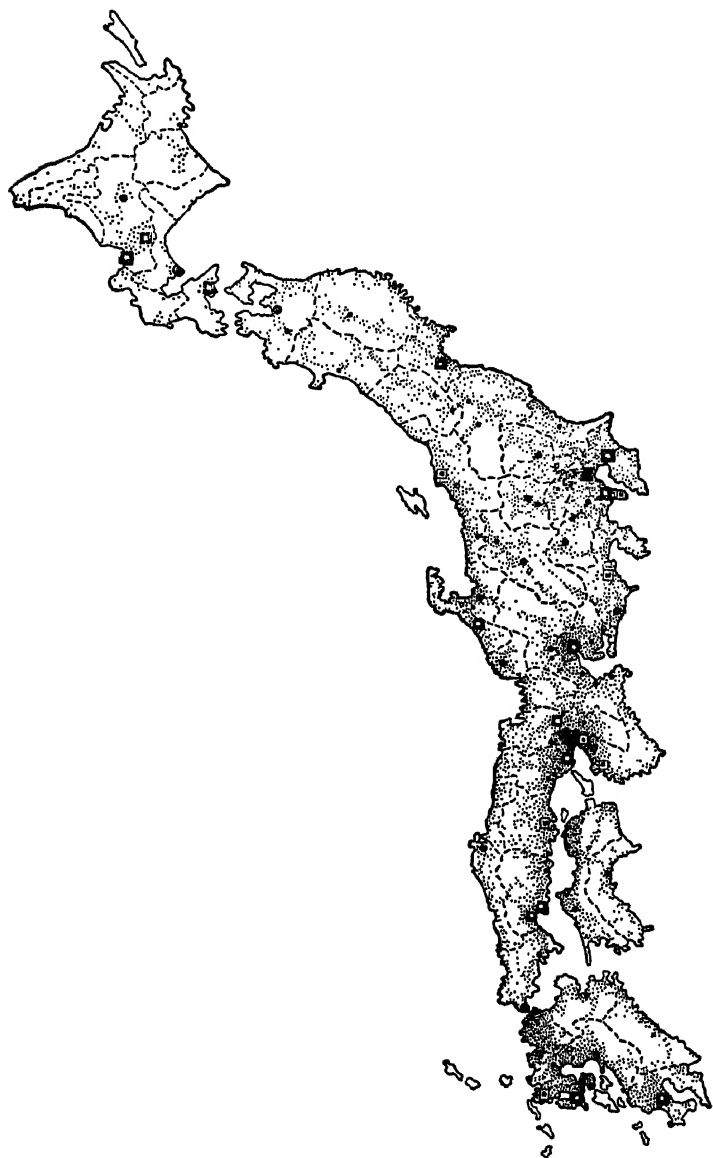


FIG. 309.—The population of Japan (1920 Census).

Each dot = 10,000 people (except the larger dots, a key to which is given in Fig. 308).

rate the population will be doubled in 40 years. No longer is the rapid increase regarded with pride as evidence of a vigorous nation; such sentiments are overruled by the fear for the food supply. For many years the *per capita* consumption of the staple food, rice, has been about  $5\frac{1}{2}$  bushels, whilst the yield of Japanese paddy-fields is about 38 bushels per acre. The 7,000,000 acres under rice could thus support about 50,000,000 people, but the new acreage being brought under rice annually is only sufficient to support about a quarter of the actual increase. Up to the present internal reorganization has supplied much of the increasing need of foodstuffs and, despite a definite increase in the standard of living, only 10 per cent. of the food consumed within the country is imported. But this cannot continue.

The increasing urbanization of Japan (in 1930, 41 per cent of the people were living in towns of over 10,000 inhabitants and the urban population is increasing at twice the rate of the rural) has lowered rather than increased the death-rate. Turning to solutions of Japan's population problem, the physical configuration of Japan proper prevents extensive agricultural expansion; even in Hokkaido the amount of available land is but small and the very rigorous winters are not only hated by the Japanese but demand a radical alteration in the mode of living. It has been officially stated that Hokkaido cannot support more than another 2,000,000. The prospects in Karafuto are still poorer. The climate of Korea is more to the liking of the Japanese, but Korea is already rather densely populated (238 per square mile in 1931) and the Japanese farmer cannot compete with the Korean farmer, with a far lower standard of living. The Japanese in Korea are mainly merchants and town dwellers. Land in Formosa suitable for occupation and cultivation is strictly limited.

For many years Manchuria was regarded by the Japanese as 'the land of promise', and Japan obtained a footing in the region after the war with Russia (1904-5) by taking over the lease of the Liaotung Peninsula (1,500 square miles) and the control of the South Manchuria Railway. The Japanese Government announced its intention of settling 1,000,000 colonists in the territory under her control within ten years, but twenty years later there were less than 100,000 Japanese in the peninsula (nearly all living in the cities of Dairen and Port Arthur), about the same number in the railway zone and about 35,000 in other parts of Manchuria—less than half being farmers. Despite the ties of the family system which prevent rapid Chinese settlement in Manchuria, it is the Chinese who have made the greater stride in settlement. Apart from the difficulties of competing with



the Chinese farmer, with a lower standard of living, the Japanese farmer does not take kindly to the rigorous Manchurian winters.

Despite the population pressure at home, Japanese emigration to foreign lands is small compared with that from many European countries. An official record is kept of Japanese emigrants or 'Japanese resident abroad'—the total number was only 635,000 in 1931 and of these 166,000 were in Manchuria or China. The main field of Japanese emigration is now to the Brazilian plateau, where over 100,000 reside and pursue coffee planting and rice farming. To this area the migrants average 10,000 per year, more than half the total emigrating. Many Japanese live in the Hawaiian Islands (150,000), but the Japanese residents on the Pacific coast of the United States (100,000) are not increasing very rapidly. Emigration is not yet supplying a solution to the population problem.

**Settlements.** Throughout its history Japan has been essentially an agricultural country. Even with the modern dependence on industrialization more than half the people are still farmers, and the commonest unit of settlement is the agricultural town with between 2,000 and 10,000 people. Well over half the people live in such towns. R. B. Hall in his study of rural settlement forms in Japan<sup>1</sup> finds that in the rice lands there is an even distribution of small compact villages except where areas are liable to violent floods when there are isolated settlements on safe or dry spots (dry-point settlements). In areas of dry-crop cultivation the farms are disseminated. The Japanese home is the plot of land: the house is almost subsidiary to it; the walls are for winter use and are partly movable in the summer, so that the living-rooms become part of the garden. This renders the house, to Western ideas, ill adapted for the cold of winter. The house is essentially a light wood-bamboo structure, unaffected by earthquakes but liable to fire very easily. It is basally of three rooms, but a house is the home of a united family and increases in size accordingly.

Japanese towns have been divided by Trewartha into (a) the indigenous towns, and (b) the six metropolises. The indigenous towns present a flat appearance with small, closely spaced individual family houses, the only large buildings being the temples and, where present, the castle. Many of these 'indigenous' towns are daimyo towns—that is, they date from the days of feudal Japan when the local lord or daimyo ruled from his castle which was surrounded by the quarters of the samurai or soldiers, and became the nucleus of a large civilian settlement. Other cities are religious centres or shrine cities; others are 'post'

<sup>1</sup> *Geographical Review*, Vol. XXI, 1931, pp. 93-123.

cities on main highways. There are also the old 'free' ports—free in the sense that they were controlled by the resident merchants.

Japan owes not a few of its cities to the ancient custom that each new Emperor should build a new capital on the death of his predecessor. Japan has thus actually had 60 capitals, mostly between Lake Biwa and the Inland Sea. By far the most important, however, is Kyoto, where the Court was established in A.D. 794 and remained till the revolution of 1868. It is to-day the western capital.

Kyoto is, indeed, one of the six great metropolises of Japan. These great cities are Tokyo (4,978,390), Osaka (2,453,573), Nagoya (907,404), Kobe (787,616), Kyoto (765,142), and Yokohama (620,306). These figures show the populations in 1930, and not only is the next city in order of size far behind (Hiroshima, 270,417), but it is different in character and belongs to the group of 'indigenous' cities, of which 22 had populations of over 100,000 in 1930.<sup>1</sup> The six great metropolises are strikingly western in character, being modelled on American rather than European prototypes.

*Tokyo* ranks next to London and New York as the third largest city in the world. A large section was destroyed by the earthquake of 1923, but the modern steel and concrete skyscrapers withstood the shocks. Tokyo is the business centre of the country as well as a manufacturing town (see p. 606).

*Yokohama* was completely razed to the ground by the 1923 earthquake and the business of the port was transferred temporarily to Kobe, but the population is now nearly 50 per cent. greater than in 1920.

*Osaka* was primarily the port of Kyoto and its region but has supplanted the old inland centre in size and importance. It is pre-eminently the cotton town and hence is called the 'Manchester of Japan'. From another point of view, owing to the many waterways, it has been called the Venice of Japan.

*Kobe* is the deep-water port adjoining Osaka.

*Nagoya and Kyoto* both combine the ancient and modern, Kyoto in particular being famed for its many temples.

**Communications.** The first railway in Japan was built in 1872 between Tokyo and Yokohama, a distance of 18 miles. In 1933 the railway mileage was 13,500, or more than half that of the British Isles. A Railway Nationalization Programme

<sup>1</sup> In order of size Hiroshima, Fukuoka, Nagasaki, Hakodate, Kure, Sendai, Sapporo, Yawata, Kumanoto, Kanazawa, Otaru, Okayama, Kagoshima, Shizuoka, Saseho, Niigata, Sakai, Wakayama, Yokosuka, Hamamatsu, Moji, Kawasaki.

was adopted in 1905-6 and more than two-thirds of the railways are State-owned. The gauge is 3 feet 6 inches. It was planned to change to standard gauge, but the cost (£140,000,000) would seem to be prohibitive. Comprehensive plans for the electrification of the Japanese railways are in hand. The Tokyo suburban lines are electrified and the steep Usui Pass section is also electrically operated.

Japan has been slower than might have been expected in the adoption of motor transport—largely due to the mountainous nature of the country and of the difficulty of building and main-

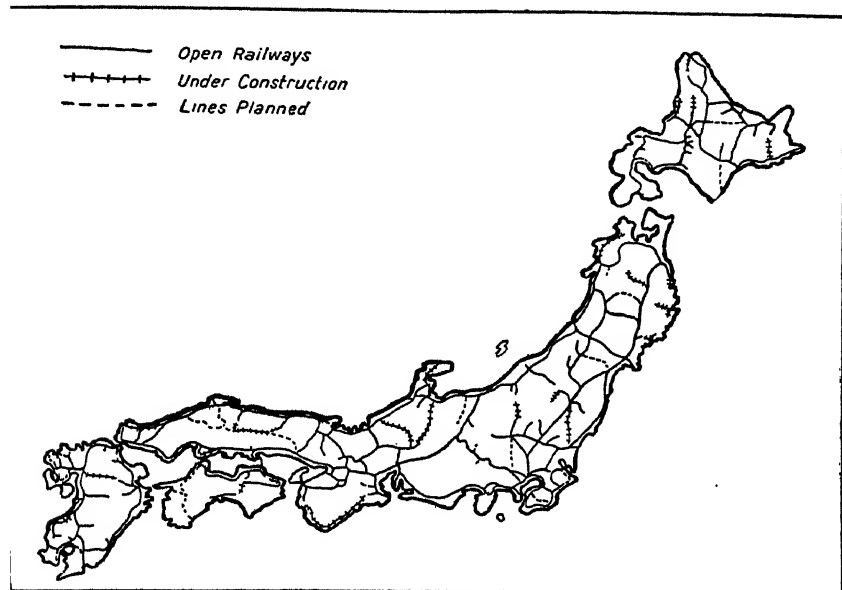


FIG. 310.—The railways of Japan.

ining roads. In 1932 there were about 100,000 motors in the country—two-thirds cars and one-third trucks. Most of the cars are taxis.

Aerial transport is receiving full attention. Regular services run to Shanghai and Dairen as well as locally in the country itself.

The ports of Japan have been made the subject of a special study by Dr. L. Mecking.<sup>1</sup> Japan has three great ports—Yokohama, Kobe and Osaka. These three handle 85 to 88 per cent. of the export trade and about 80 per cent. of the import trade.

<sup>1</sup> *Japans Häfen, Mitteilungen der Geog. Gesell., Hamburg, Vol. XLII, 1931.*

Kobe leads (about 35 per cent. of the total foreign trade), followed by Yokohama (30 per cent.) and Osaka. Nagoya and Moji each share about 3 or 4 per cent. of the foreign trade, so that the minor ports such as Hakodate, Shimizu, Yokkaichi, Wakamatsu and Nagasaki have in each case less than one per cent. of the foreign trade.

**Foreign Trade.** Reference has already been made to Japan's attempt to solve her population problem by becoming the out-

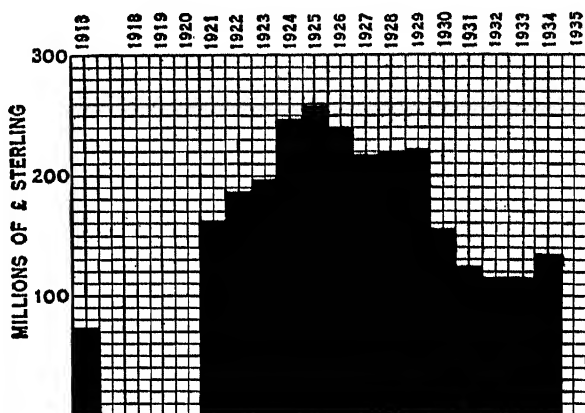


FIG. 311.—The rise in the value of the exports of Japan.

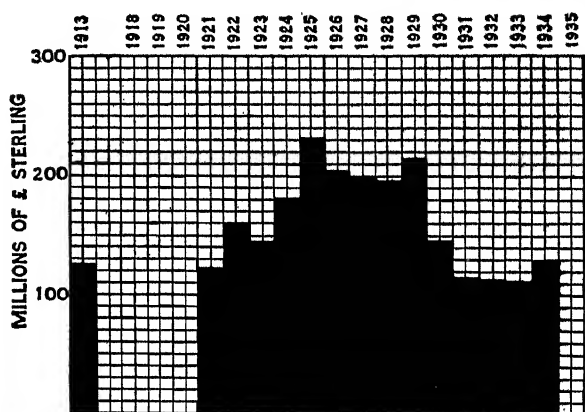


FIG. 312.—The rise in the value of the imports of Japan.

standing manufacturing country of the East and by selling her manufactures in the world's markets to pay for her imports of foodstuffs and raw materials. Thus the expansion of her foreign trade has been an essential feature of Japanese policy for many years. The Japanese yen was put on a gold basis at  $Y1.00 =$

24.5 pence in 1897, so that the trade expansion before the Great War is accurately shown in pounds sterling or in gold dollars :

	Value in Millions Sterling.		Value in Gold Dollars.	
	Imports.	Exports.	Imports.	Exports.
891-95 . . . . .	11.51	12.61	55	60
901-05 . . . . .	35.92	30.23	175	150
906-10 . . . . .	46.40	43.70	230	215
911-13 . . . . .	64.63	55.51	320	275
925-29 <sup>1</sup> . . . . .	213.48	187.55	1,050	925

<sup>1</sup> 1 yen = 1s. 10d., or 10.8 yen = £1.

The post-war expansion is shown in the two diagrams opposite, Figs. 311-12. Measured in yen Japanese foreign trade, unlike that of any other country, has expanded continuously throughout the world depression. The expansion of the export trade during the war was clearly due to the inability of European nations—including Great Britain—to feed the countries of the Orient (notably India) with textiles and other manufactures. Japan stepped into the breach. After the war some of the new markets were retained, others lost. Japan has sought continuously for new lands to which to send her manufactures, with the result that Japanese trade is to-day almost worldwide. Before the war raw silk represented a third of all the exports, other silk another 10 per cent. A third of all the exports went to the United States, a quarter to China and 10 per cent. to France.

The recent position is shown in Figs. 313 and 314. The diagram of exports illustrates the dominant position still occupied by silk, but it shows the enormous importance now of cotton goods, silk and rayon goods. In 1911-13 cotton goods only represented 5 per cent. of the total. The diagram of imports shows how utterly dependent upon imported raw cotton—largely from the United States—is the cotton industry.

Fig. 315 shows the varied direction of the foreign trade in recent years.

An analysis of the year 1934 is interesting in that it shows certain marked changes in a year of world depression. Among the exports raw silk dropped to 13 per cent.; textiles rose to 5 per cent. (cotton goods 23 per cent., rayon goods 5 per cent.). Among imports raw cotton remained at 32 per cent., raw wool rose to 8 per cent., petroleum represented 4 per cent.

In studying the foreign trade of Japan care must be taken

to distinguish between foreign and inter-imperial trade—the importance of the latter being due to the economic division of the Empire into inner and outer zones, the function of the outer zone being to supply food and raw materials to the inner. But

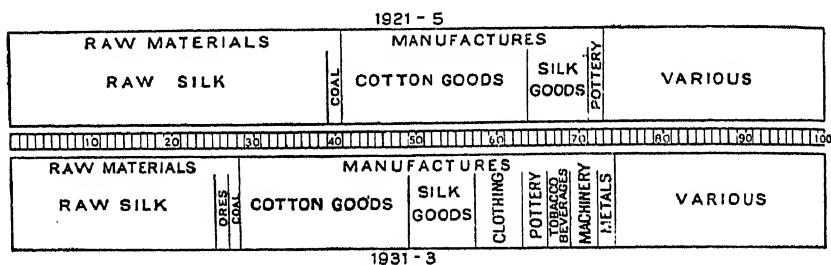


FIG. 313.—The exports of Japan.

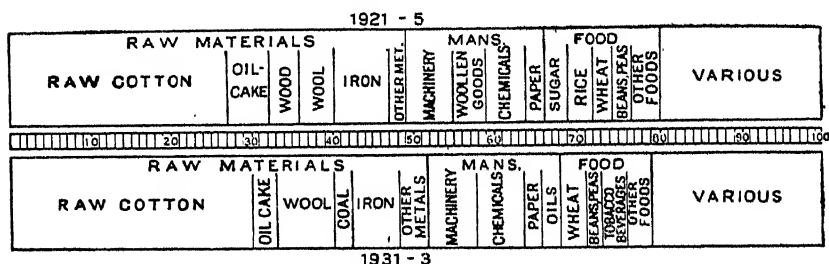


FIG. 314.—The imports of Japan.

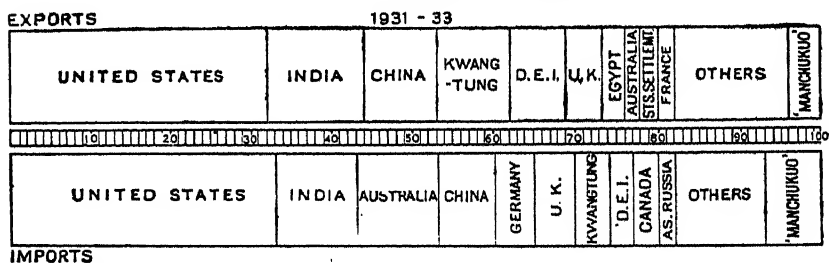


FIG. 315.—The direction of the foreign trade of Japan.

the outer zone is far from being able to supply all the needs of Old Japan.

### THE NATURAL REGIONS OF JAPAN

'Complexity and fineness of pattern are the keynote of the geology and geomorphology of Nippon.' So writes G. T. Trewartha in his *Reconnaissance Geography of Japan*.<sup>1</sup> In view

<sup>1</sup> University of Wisconsin Studies in the Social Sciences and History, 1934.

the youthfulness of the Japanese topography and the exceptionally mountainous nature of the country, the human population is of necessity restricted to the small areas of lowland or plain and any regional division of the country based on human occupancy features must not only reflect the 'complexity and unevenness of pattern' of the geomorphology, but any division so used must bear an unusually close correlation with that based on physical features. It is therefore difficult to suggest a division

Japan into natural regions without getting an inordinately large number. Fortunately an excellent detailed treatment of the regional subdivisions of Japan is now available in English and the account which follows is summarized essentially from Trewartha's work and may be looked upon as an introduction to his fuller account. It has not seemed necessary to deal separately with the regions of Hokkaido, where a simpler division has been adopted, and in some areas Trewartha's subdivisions have been grouped. His scheme is as follows:

A. Hokkaido.

1. Peninsular Hokkaido.
2. Ishikari-Yufutsu Lowland.
3. Eastern Hokkaido.

B. Ou (or Northern Honshu).

1. Eastern Highlands.
2. Eastern Lowlands.
3. Central Mountain Range.
4. Western Intermontane Basins.
5. Western Mountains and Hills.
6. Western Plains.

C. Chubu (or Central Honshu).

1. Central Mountain Knot.
2. Lowlands of the Japan Sea Littoral.
3. Lowlands of the Pacific Coast (including the Kwanto or Tokyo Plain and the Nagoya Plain)

D. Inner Zone of South-west Japan.

1. Kinki or Eastern Setouchi.
2. Central Setouchi (Inland Sea).
3. Sanin Littoral.
4. Northern Kyushu.

E. Outer Zone of South-west Japan (Pacific Folded Mountains).

1. Southern Kyushu.
2. Southern Shikoku.
3. Kii Peninsula.

In most cases these subdivisions are actually groups of small units, thus the 'Western Intermontane Basins' of Ou comprise several separate basins.

## OU, OR NORTHERN HONSHU

This division comprises the portion of Honshu lying north of approximately  $37^{\circ}$  and is thus the northern part of 'Old Japan'. Structurally and topographically it consists of the three north-south ranges separated by longitudinal depressions described on p. 584, and the limit of the region has been chosen on a topographical basis—where the ranges give place to the great Kwantō plain. Climatically, most of the region has a January average below  $32^{\circ}$  and the frost-free season is 160 to 200 days. The southern limit also approximates roughly to the limit of the temperate forests (with deciduous trees predominating) and the brown soil region. There are contrasts between this northern region of Old Japan and Hokkaido in that farms are smaller, settlements are in the form of small villages rather than isolated farms. But when compared with regions further south there are also marked differences—there are few large towns, only Niigata and Sendai having more than 100,000, whilst there are no first-class ports and manufacturing is poorly developed. Agriculturally there is little tea or sweet-potato cultivation; mulberry cultivation becomes unimportant about lat.  $39^{\circ}$  or  $40^{\circ}$ .

1. **The Eastern Highlands** form part of the Outer Zone of Northern Japan mentioned on p. 584, and consist of two mountain masses, the Kitakami and the Abukuma, separated by the Sendai Lowland. The small population is found in the small valleys and on the tiny delta fans. In the old rocks of the northern hill mass is one of the two significant iron-ore deposits of Japan; adjacent to one of the intrusive masses of the southern hill mass is the copper deposit of Hitachi. Along the coastal strip in the south is the Joban coalfield, the third in order of importance of the fields of Japan.

2. **The Eastern Lowlands** include three separate tracts: (a) the Mutsu Plain in the north; (b) the Kitakami or Sendai lowland which separates the two hill masses just described and extends northwards to border the Kitakami hill mass; and (c) the Abukuma Lowland, a river valley which borders the Abukuma Highland on the west. The northern area suggests certain comparisons with south-eastern Hokkaido—especially in the extensive horse breeding carried on in the moor-like areas. In the Kitakami lowland the mulberry tree first appears, the low, wet, alluvial lands are occupied by wide stretches of paddy, but the winter cold prevents double cropping of the paddy lands with fall-sown crops. Where the plain reaches the coast is the famed resort of the pine-clad islands of Matsushima Bay, but



e metropolis of the region, Sendai, is inland. Sendai is the at of an Imperial University and the largest city in Northern onshu, but is not a manufacturing town. The southern, ukuma Lowland is warmer in winter, the mulberry is more undant and winter cropping of paddy-fields is practised.

3. **The Central Mountain Range** is the climatic divide of e northern part of Japan and the range is accentuated by line of seven fine volcanic les, one at least reach- g a height of over 6,000 et. There are forest and ineral resources, but more important is the heavy pre- citation which affords a urce of irrigation water and power to the basins lying the east and to the west.

4. **The Western Inter-ontane Basins** are nine in umber and form an irregular ring west of the Central vide. Each basin has a od-plain floor and a small rounding piedmont belt alluvial fans. They have rk, gloomy winter weather th abundant snow which terrupts traffic and pre- nts the cultivation of nter wheat or barley. The uses have various devices ainst the heavy snow— de eaves and covered side- lks. The basins from orth to south are Aomori ith Aomori, the ferry port r Hokkaido through Hakodate), Hanawa, Odate, Yokote (the ggest), Shinjo, Yamagata, Yonezawa, Wakamatsu, and awashiro. (These are numbered *a* to *i* on Fig. 316).

5. **The Western Mountains and Hills** consist of an elon- ted mass with a crystalline core, the whole separated into a umber of blocks by four traverse river-valleys. In the Dewa lls are mineral deposits; among the foothills to the west, rdering the Japan Sea, are the Akita oilfield and, further uth, the oilfield on the borders of the Echigo Plains.

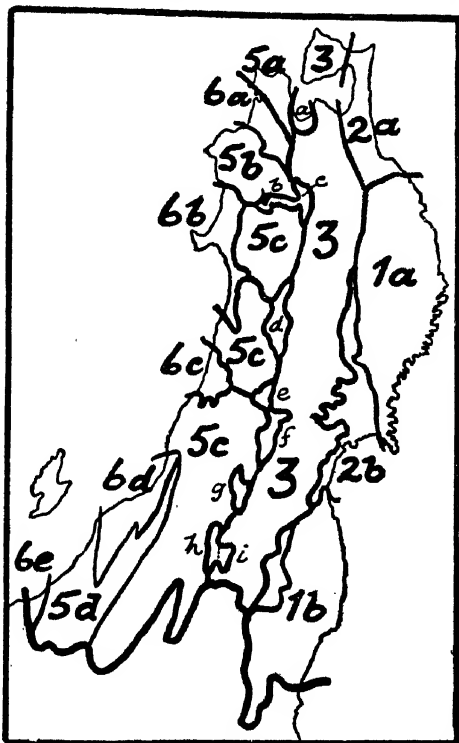


FIG. 316.—Map showing the natural regions of Northern Honshu.

(Numbers correspond with textual descriptions.)

6. **The Western Plains** suffer also from dark, stormy winter weather with much snow. The strong winter winds and the heavy seas have prevented the formation of a continuous coastal lowland; there is instead a succession of small infilled depressions. Natural harbours are naturally few; Niigata is the only considerable port-town. Rice is the chief crop; the winter weather prevents the cultivation of the winter cereals. Even the houses have to be protected against winter storms and large boulders are used to weigh down the roofs. From north to south the plains are: Tsugaru (Iwaki) (6*a*), Noshiro-Omono (6*b*), Shonai (Mogami) (6*c*), Echigo or Niigata (6*d*) and Takata (6*e*).

### CHUBU, OR CENTRAL HONSHU

Chubu includes the broadest part of Honshu and is occupied mainly by a confused mass of mountains, mainly of volcanic origin. Through the centre of the knot, and running from coast to coast in a direction N.N.W. to S.S.E., is the great rift valley referred to above as the Fossa Magna. It is partly filled with young volcanic rocks, including Fujiyama, and sediments. On the Pacific side of Chubu are three large bays of faulted origin; two of them now largely infilled and forming the very important Nobi and Kwanto Plains.

There is, of course, a marked difference between the Pacific and Japan Sea sides, but the whole region has abundant rain, long hot summers, a frost-free season of 180 to 260 days, a January average of well above freezing (and with minimum temperatures only a few degrees below). On the lowlands the sub-tropical woodlands of broad-leaved evergreen trees reach their poleward limit. Tea cultivation and mulberry trees reach their maximum, for more than half the acreage of mulberries is within this region, which is thus the focus of Japanese sericulture. Kwanto is the largest as well as the most densely populated of Japan's plains.

1. **The Central Mountain Knot** includes (*a*) the Fossa Magna and its associated volcanic piles, including Fuji; (*b*) the mountain masses to the east; and (*c*) to the west of the depression. Where the depression meets the Japan Sea is the natural 'back door' to the heart of the country, but formidable mountains guard the approach to Tokyo and the developed Pacific coast. Much of this country is famed for its hot mineral springs and there are many spas and resorts. The mountain streams supply water for electric-power installations, but the population is naturally concentrated in the frequent tiny basins. In many of these sericulture overshadows in importance the other activities

of the farmers. The Suwa Basin<sup>1</sup> is thus the largest single silk culture centre in Japan. Each basin boasts a town of considerable size—often approaching 100,000. The chief basins with their towns include Matsumoto (Matsumoto), Suwa (Okaya), Kofu (Kofu), Nagano (Nagano City, a famous Buddhist shrine), and Ueda.

Amongst the volcanic highlands east of the depression lies the celebrated town of Nikko, with its wonderful Buddhist temples, and Karuizawa, a hill station well known to foreign visitors. The Ashio mountains are noteworthy for one of the richest copper mines of the country.

Amongst the mountains of the west of the depression are numerous mining settlements.

**2. The Lowlands of the Japan Sea Littoral** lie on either side of the Noto Peninsula. To the east of the Peninsula is the Toyama Alluvial Piedmont which differs from the other lowlands along the Japan Sea coast in that it is not a wet low area but a region of steep alluvial fans and lacks the wide belt of parallel beach ridges and dunes usually found. It is further a region of dispersed settlement—a feature indicative of comparatively recent utilization of the coarse rather poor soils. Despite the paddy rice is the dominant crop. The different character of the coast is due to the protection afforded by the large rocky Noto Peninsula, and the local port, Fushiki, seeks its shelter also. Toyama and Takaoka are the two commercial centres, the former a textile town also.

To the west of the peninsula are narrow alluvial plains, protected from the strong winter winds by wind breaks of conifers planted along the beach ridges. Kanazawa, a silk-weaving town, is the metropolis of the plain and of the whole west coast of Honshu as well. Its industry is shared with Fukui and many smaller centres.

**3. The Lowlands of the Pacific Coast** include some of the most important parts of Japan.

The *Kwanto* or *Tokyo Plain* has an area of rather over 2,500 square miles and supports nearly 12,000,000 people. A great depression in the solid rocks has become largely filled in with ash-water or marine gravels, sands and clay, overlain by several feet of volcanic ash laid down in shallow water or subaerially. High elevation has resulted in steep bluffs along the river valleys and parts of the coast and two major terraces can be distinguished. The infertility of the recent ashes was partly responsible for the late settlement of the plain, which remained a wilderness

<sup>1</sup> This basin has been made the subject of a detailed study by Trewartha see *Geog. Review*, Vol. XX, 1930, pp 224-44.

whilst Kyoto was at the height of its glory. The development followed the establishment of the residence of the ruling Tokugawa Shoguns at Yedo (Tokyo) in the latter part of the sixteenth century. Even to-day, despite the enormous population, rural density is only half what it is on the older plains.

In some of the lower levels drainage is imperfect and villages are strung out along drainage dykes. Elsewhere, too, villages are of the 'Strassendorf' type because of the advantage of easy access to fields. In the easily irrigated lowlands rice is naturally the chief crop, but the paddy-fields lie fallow or with a leguminous fodder crop in the cool season. At slightly higher levels mulberry trees and dry crops take the place of rice. Large areas

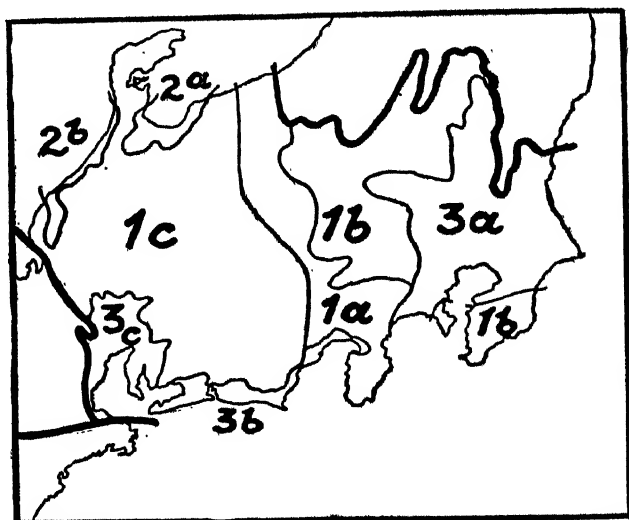


FIG. 317.—Map showing the natural regions of Central Honshu.

of slightly elevated ground have no rice at all, but are devoted to vegetables, beans, peas, sweet potatoes, millet, autumn-sown wheat and barley. Tea gardens occupy a large acreage and there are large tracts of specialized tobacco culture and many of the higher terraces are in woodland or moor.

More than 80 cities and towns on the Kwantō Plain have over 10,000 inhabitants, but they are overshadowed by the great metropolis of Tokyo and by Japan's second port, Yokohama. Tokyo and Yokohama have already been considered; it should be noted that Tokyo is not only a convenient centre for the whole of Japan, but as ports Tokyo and Yokohama include within their hinterland the whole of northern Japan—due largely to the absence or poverty of harbours in northern Honshu.

*The Sun-en Littoral* is the coastal strip from the Izu Peninsula to Ise Bay and consists of a succession of densely populated delta fans devoted to rice cultivation alternating with beach or dune settlements supplying market garden produce to the readily accessible metropolitan centres. Very mild winters and heavy rainfall favour the growth of citrus fruits, and this is the home of Japan's famous Mandarin oranges, whilst one-half of Japan's tea crop (including the green tea) is grown on the neighbouring hillsides. The region lies on the main routes—the Tokkaido Railway and Highway—between the plains of Kwanto and Kinki and forms part of the great manufacturing belt, enjoying the advantages of easy access, cheap hydro-electric power and abundant clean water. Shizuoka city has tea-packing and cotton industries, Hamamatsu is also a cotton textile town.

*The Nobi or Nagoya Plain* (Ise Bay lowland) resembles the Kwanto Plain in its origin; again, the low new alluvium is a paddy-fields, the smoother lower terraces in rice and dry crops—including tea, oranges and mulberry—while the higher terraces suffer badly from erosion and support but few people. Nagoya is the metropolis of this plain as Tokyo is of Kwanto, but it has not the advantage of being, or of possessing, a deep-water port. Yokkaichi is a roadstead port and exports the porcelain largely produced in the plain, and imports raw cotton for Nagoya's mills.

### THE INNER ZONE OF SOUTH-WEST JAPAN

This region comprises the lands on either side of Setouchi or the Inland Sea together with the whole of the western end of Honshu, including the Japan Sea coast. Northern Kyushu has the larger part of Japan's reserves of coal, but otherwise minerals are unimportant. Climatically the region has a January average of about 40° F., a July average about 75° to 78° F., with a frost-free season of 200 to 240 days. There is naturally contrast between the Japan Sea coast, with its winter clouds and snow—lying on the ground to the depth of an inch or two—and the Inland Sea coast, with bright clear winters and no snow.

The basin of the Inland Sea is the heart of Old Japan. Here are the old capitals with their temples, shrines and palaces: here population density and pressure on the limited amount of cultivable land reaches its maximum. Terracing of the hillsides has reached a maximum; most fields are double cropped with rice in summer and wheat or barley in winter. Here, too, is half

of Japan's industrial belt and such great modern centres as Kobe and Osaka.

1. **Kinki or Eastern Setouchi** includes a number of semi-isolated alluvium-filled basins and associated hill lands. The basins, which are graben or fault basins, are five in number—Biwa (Omi), Yamato (Nara), Kyoto (Yamashiro), Osaka (Settsu) and Kino.

(a) *The Biwa (or Omi) Basin* is the largest and contains Lake Biwa, Japan's largest lake. The basin extends almost to the Japan Sea on the north and thus almost breaks through the northern mountain barrier. It has thus been from ancient times an important route way; the railways of to-day tunnel through the hill barriers at the northern and southern ends and place the Japan Sea coast within the hinterland of Osaka and Kobe. The basin is typical of those of Kinki as a whole. There are three 'zones': an alluvial zone with rivers controlled between dykes; an intermediate zone of low terraces with a good soil; an outer zone of higher terraces often with a gravelly soil and exhibiting 'bad-land' features. The lake is attractive scenically and many tourists visit Mt. Hiei with its Buddhist temples and wonderful panoramic views.

(b) *The Yamato or Nara Basin*<sup>1</sup> is a very thickly populated tract, marked by its innumerable small rectangular villages not infrequently enclosed by moats. This results from a rectilinear partition of the land which took place before the seventh century. The low-lying paddy lands lie fallow in winter, but three-quarter of the better drained terrace land are double cropped—some treble cropped. The metropolis of the basin, Nara City, although only boasting 53,000, is famed as the first permanent capital of Japan, and its temples are visited by 3,000,000 tourists a year.

(c) *The Kyoto or Yamashiro Basin* resembles in general features the others; bamboo grows extensively along the river courses, pears flourish along the eastern margins and the region is famed for the excellence of its teas. The land utilization shows the remarkable rectangular pattern resulting from its partition. Kyoto, the city of this basin, is one of Japan's six great cities and for eleven centuries (until 1869) was the site of the Imperial residence. It is an old city of great charm, full of delightful temples and temple gardens, and has not been ruined by modern industrialization. Instead, it remains the city of craftsmen catering to the wealthy and the artistic.

(d) *The Osaka or Settsu Plain* differs from the last three in

<sup>1</sup> See R. B. Hall, 'The Yamato Basin', *Annals Assoc. American Geographers*, XXII, 1932, pp. 243-91.

that it is a coastal plain—the bayhead delta of the broad, dyked Arakawa River. The plain is densely populated and intensively cultivated, but is chiefly remarkable in that it has become the leading industrial region of Japan. The Osaka-Kobe industrial region, including Sakai and Kishiwada as secondary foci, has a quarter of Japan's factory workers and produces a third of the nation's manufactured goods. Many industries are represented, with cotton textiles of outstanding importance. Osaka, the 'Manchester' of Japan, is the centre of the cotton trade, with 2 million people, and if one includes domestic traffic, is the leading port of Japan, though surpassed by Kobe and Yokohama in foreign trade. Kobe, 16 miles down the bay, has deep water, a modern city on a narrow coastal strip and is a port and commercial rather than industrial centre. It handles much of the raw cotton which comes in and much of the raw silk which goes out of the country.

(e) *The Kino Graben*, a narrow rift valley, is famed for its orange groves. At the seaward end is Wakayama, an outlier of the Osaka industrial region.

2. **Central Setouchi** (the Central Inland Sea region) is a name conveniently applied to the lands on either side of Japan's Mediterranean. It is an area of subsidence which had been a naturely dissected lowland and is now a tract of calm, blue water dotted with innumerable islands. The neighbouring hills are bare and show up in contrast with the small cultivated plains and the closely spaced settlements with their carefully terraced steps behind. The innumerable towns which lie between the great metropolitan agglomeration of Kobe-Osaka at one end and the sea and the Moji-Shimonoseki port area are mostly small and carry on a great variety of industries—cotton spinning, paper, chemical, metal and brewing (of beer and saké) are some of the chief. Along the coasts are numerous salt pans and an aquatic plant is cultivated for the manufacture of 'reed' mats. The quietness of the waters, the ten-foot tide and cheap local fuel from Ube favour the salt-boiling industry. Hiroshima is the metropolis of the region and a city with a colourful past. There is a military and naval station, with steel mills and the largest dry dock in the country. Okayama is a local manufacturing centre, whilst Tokushima and Matsuyama are the leading centres on the Skikoku side of the Inland Sea.

3. **The Sanin Littoral of Northern Chugoku** is well described by its Japanese name, Sanin, meaning 'shady side'. It refers to the darker, gloomier and stormier weather of the San Sea Littoral when compared with the Setouchi. In most respects it presents a contrast—smoother coastline, fewer

people, fewer cities, limited development of manufacturing. It lacks extensive plains, so that general subsistence agriculture is the rule, with moderate numbers of cattle. The coastal villages are agricultural-fishing settlements and only three towns have more than 20,000 people. Of these Matsue is the chief. The hill country is still largely forested, so that charcoal burning there is a significant industry.

4. **Northern Kyushu** is geologically and morphologically a very complex region, with the result that its human geography is both complex and varied. The region ought naturally to be divided into a large number of small units—there are barren granite hills, dissected ash and lava plateaus and volcanic cones and small but important basins. Climatically the region is partly exposed to the north-west monsoon: it shares in some of the stormy cloudy weather of the northern coasts and has less sunshine than the Inland Sea regions.

*The Tsukushi Hill Lands and Associated Plains* include the most important coalfield in Japan, the Chikuho Basin. Railways connect the numerous mines and take the coal northwards to the ports of Wakamatsu and Moji and to the important industrial belt which lies along the coast between them and includes also the towns of Yawata, Tobata, and Kokura. This is the focus of Japan's 'heavy' industries—including iron and other metals. Its favourable centre relative to coal and the import of heavy and bulky raw materials (including iron ore and pig-iron) are the significant factors with iron and steel concentrated at Yawata. Moji guards the entrance to the Inland Sea—the entrance being but little over a mile wide. The Miiki Coalfield occurs in another part of the region; but the chief town is Omuta.

*The Northern Volcanic Region*, with its wild undeveloped landscape, plateaus and very varied scenery, offers great contrasts with the coalfields. Frequently the scenery is very beautiful; hot springs have given rise to resort centres, whilst the great pile of Mt. Aso is almost a rival to Fuji.

*Insular and Peninsular North-western Kyushu* includes the Hizen Peninsula and the Amakusa Islands and is again a very complex region. The northern part of Hizen includes the coalfields of Sasebo and Karatsu. Sasebo City is a fortified naval station with dockyards and an arsenal, whilst the coal from the second basin leaves by the small port of Karatsu. The towns of Imari and Arita produce much of Japan's fine porcelain from local kaolin. The southern part of Hizen consists of the sprawling peninsulas and the old port city of Nagasaki occupies the head of one of the deep indentations. As a coaling station



has suffered from the growing use of oil and in foreign trade has dropped from third to tenth place amongst Japan's ports. But it is the nearest port to China and was the first of Japan's ports open to foreign trade. Except for one great shipbuilding establishment, it is not a manufacturing town but a picturesque overgrown village, straggling over steep hillsides and with evidences of its early foreign intercourse.

## OUTER ZONE OF SOUTH-WEST JAPAN

This region lies south of the great fault line which separates the Inner and Outer Zones of South-west Japan. It consists mainly of ancient crystalline schists and old sedimentary rocks and is a region of rugged mountains and hill country. There are well-developed longitudinal ridges and valleys with a general trend from N.E. to S.W.; but the valleys are narrow and steep-sided and the areas of lowland very restricted. Climatically it is the most nearly tropical region of Old Japan—the humid summer months have temperatures averaging nearly 80° F., eight months (250 days) are frost-free, while light frosts only occur on 30 or 40 days, even in the winter. There is a heavy summer rainfall and hurricanes are frequent in the late summer. The natural vegetation is subtropical forest with dense undergrowth: palm and camphor trees are represented in the indigenous flora. But the rugged nature of the region has prevented extensive settlement; there are no important ports and manufacturing is undeveloped. The two channels which connect the land Sea with the Pacific Ocean divide the region into three parts.

1. **Southern Kyushu** differs from the other parts of the region in the prevalence of ash and lava plateaus. Forests on the large areas and forest industries are important; the region includes some mining country, notably the copper-gold mines of Saganoseki. On the ash beds are tracts of grass supporting numbers of horses. Owing to soil and topography rice is relatively less important than beans, sweet potatoes, winter grains and tobacco, whilst this is the only part of Japan where sugar-cane is extensively grown. Certain more fertile coastal strips were until recently difficult of access. The construction of a railway to Miyazaki has resulted in an immigration, whilst other sections have long had a close association with the Ryukyu Islands.

2. **Southern Shikoku** consists of ridges and valleys of old sedimentary rocks. The amount of cultivable land is very limited and a very interesting 'cottage industry', with

which the farmers supplement their income, is the manufacture of Japanese paper from the fibres of two local shrubs. The mines of the region include Besshi, the copper from which is smelted on a small island in the Inland Sea in order to prevent damage by the fumes to growing crops.

3. **Kii Peninsula** is a rugged, isolated region, almost uninhabited except round the margins.

### THE RYUKYU (LOO CHOO) ISLANDS

The islands of the Ryukyu arc are the summits of a submerged mountain chain. In many cases the islands are sur-

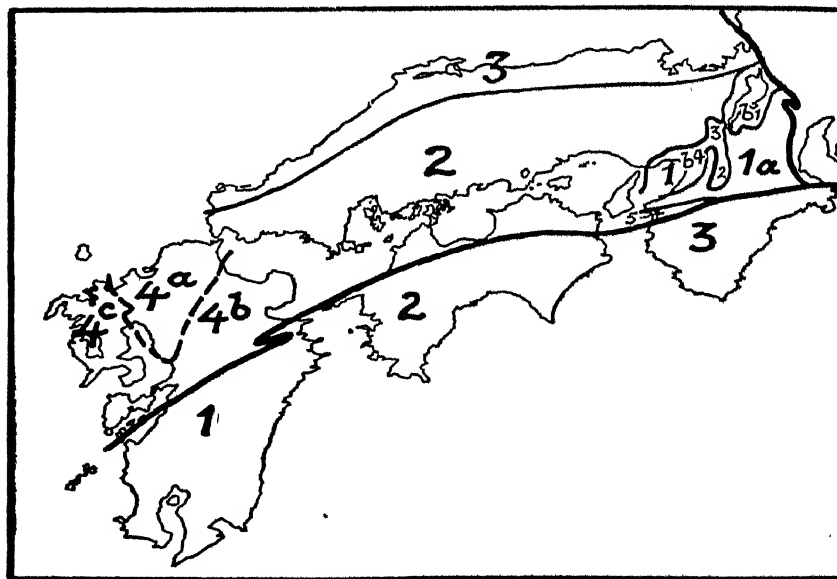


FIG. 318.—The natural regions of South-west Japan.

rounded by coral reefs. Although administered as part of Japan proper, these islands have had a different cultural history, with long centuries of contact with China, a virtually complete autonomy under their own kings until recent times and agriculture influenced by the almost tropical conditions—comparable with those in Taiwan. Thus to-day the sweet potato is the chief sustenance crop, occupying 40 per cent. of all the arable land. Owing to the recent growth of the sugar industry sugar-cane is the chief money crop and exceeds rice in importance—rice now only occupying 12 per cent. of the cultivated

round. As in Taiwan, various tropical fruits such as bananas and papaya (pawpaw) are grown for export to Japan. The limited area under rice and the poor yield due to inadequate use of fertilizer has led to a food problem and a consequent emigration to Old Japan.

### TAIWAN (FORMOSA) <sup>1</sup>

The Tropic of Cancer passes almost through the centre of the island of Taiwan or Formosa, hence it is justly referred to as Japan's tropical possession. Included administratively with Taiwan are the Hokoto Islands or Pescadores and various small islands lying near the coast. The main island is traversed from north to south by a great range of mountains which divides it into two parts, east and west. The eastern half is exceedingly rugged and is the home of numerous aboriginal tribes. Among the peaks, Mount Niitaka rises to 14,500 feet; Mount Sylvia to nearly 13,000 feet. The volcanic peak Dalton (3,630 feet) lies in the north of the island with numerous hot springs in its vicinity. The western half is, by comparison, flat, fertile and generally well cultivated. The best land is in the south-west and yields two rice crops a year, but even in more hilly parts much of the land has been brought under cultivation.

The January average of coastal stations ranges between 50° and 65° F., the July average between 80° and 85° F. The southern part of the island comes under the influence of the south-west monsoon and the rainy season is in summer; the north of the island, on the other hand, is more under the influence of the north-east monsoon and has its rainy season in winter, the rains often being extremely heavy (Kashoryo, 289 inches per year). The heavy rainfall from the summer monsoon in the mountains, notably in the south, results in autumn floods which are often serious—especially after abnormal rainfalls due to typhoons.

In 1932 the population of the island was 4,932,433, including 148,539 Japanese and 42,208 foreigners, the remainder being described as 'natives', but 95 per cent. of them are Chinese who immigrated from Fukien and the Canton area. The chief towns are Taihoku (266,066 in 1932), Tainan, Keelung and Taichu. The aborigines number 145,000 and belong to about nine different tribes, all ethnologically allied to the Malays. They are grouped roughly into the northern tribes—savage head-hunters still far from completely influenced by Japanese administration—and

<sup>1</sup> Owen Rutter, *Through Formosa* (London: Unwin, 1923); E. H. de Bunsen, 'Formosa', *Geographical Journal*, Vol. LXX, 1927, pp. 266-286.

the southern tribes, more submissive and civilized. The aborigines occupy roughly half the island—the eastern half—and there is a frontier guard zone where an electrically charged barbed wire fence and frontier guards prevent the descent of the savages upon the settled communities of the plains. The Japanese have set themselves the task of gradually subduing and civilizing the aborigines, their administration being contrasted with the apathetic rule of the Chinese from whom the Japanese received the island in 1895 after the Sino-Japanese War.

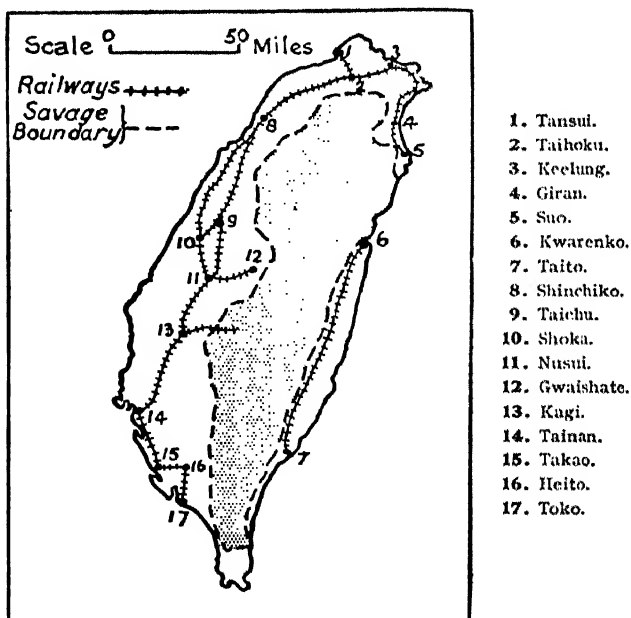


FIG. 319.—Formosa—native territory stippled.

The natural vegetation of Formosa is tropical forest which in *Ficus wrightiana*, var. *japonica*, and *Pandanus odoratissimus* are characteristic trees, and bamboos flourish. Forests similar to those of Japan, with *Chamaecyparis obtusa*, occur at higher levels. The forest area is estimated at nearly 20,000,000 acres, but this includes much waste land, due to reckless felling, especially in the west. Three main areas are scientifically exploited:

- (a) Arisan—a chain of hills rising 2,800 to 8,700 feet above sea-level—east of Kagi city. The exploitation is for both conifers and hardwoods. A lumber line runs from Kagi, where there are saw-mills, into the forests.

- (b) The Hassenzan is a forested mountain lying east of Taichu and reached by a light railway.
- (c) The Dakusui Valley in Giran is a very rich area, but still infested by head-hunters.

Special interest attaches to the camphor trees of Formosa, and it is from this island that the bulk of Japan's output is obtained. The manufacture of camphor and camphor oil is licensed by the Government to the Formosa Manufacturing Company, a Government monopoly having been instituted in 1899 to prevent the rapid felling of the trees. The huge recent expansion in the industry is due to the use of camphor in the

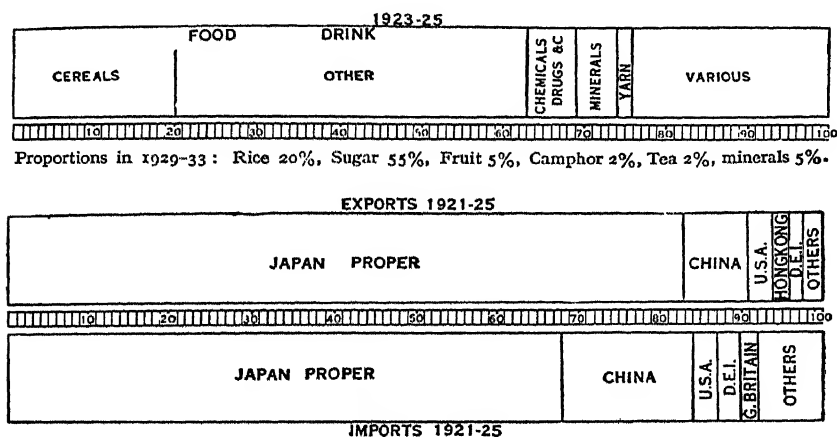


FIG. 320.—The trade of Formosa.

The upper diagram shows the articles of export; the lower diagrams the direction of the trade. The importance of this colony to Japan is at once apparent. In the last few years the proportion of trade with Japan has steadily increased. Imports marked 'China' now come mainly from Manchuria (oil-cake for use as fertilizer).

celluloid industry, but recently synthetic substitutes have undermined the industry.

Taiwan is rich in minerals, including coal, gold, copper, petroleum, sulphur and phosphorus. The mining is carried on by the Japanese. The exploitation of coal is a recent feature; the mines are near Keelung and the output is normally between 1,000,000 and 2,000,000 tons. Petroleum has become important since 1925.

The agriculture of Formosa is essentially Chinese in character and contrasts strongly with Japan. On every farm are pigs and ducks; water buffalo are almost exclusively used; the farm implements, the methods of farming and the two-wheeled cart are all typically Chinese.

Agriculturally Formosa is important to Japan in two ways. Rice is grown in excess of requirements and hence there is surplus available for export to Japan. In the second place tropical crops, notably sugar-cane, which can scarcely be grown in Japan proper, flourish in Formosa. Lowland paddy-fields occupy nearly a million acres and upland cultivation a similar area, but owing to double cropping 1,300,000 acres are under lowland rice; 310,000 acres under sweet potatoes; 75,000 acres under beans; 300,000 acres under sugar-cane and 60,000 under ground-nuts. The total production of rice is about 25,000,000 bushels, of which 15 per cent. is exported. The sweet potato is important as a staple article of food for the natives and also exported as material for alcohol. It can be cultivated all the year round. The Japanese have worked strenuously to put the sugar industry on a firm basis, but Formosa is still far behind Java in essential particulars such as irrigation, systematic fallowing, yield, etc. Nevertheless, the industry has grown from small beginnings to a yield of 355,000 metric tons of raw sugar in 1922, 571,000 metric tons in 1927-28, and over 600,000 metric tons in 1933-34.

The 'Oolong' tea of Formosa is also famous for its delicate flavour and the annual production is about 25,000,000 lb with a large export to the United States and Britain. Jute and ramie (China grass) are promising crops. The State monopolies in Taiwan, apart from camphor and salt, include opium (the use of which is being gradually suppressed) and tobacco, the output of which is still insufficient for the island's requirements. Fruits—oranges, longan, bananas and pine-apples grow well and there is a rapidly increasing export.

The fishing industry has recently made progress and employs nearly 200,000.

Taiwan has a main trunk railway from Keelung to Takao (274 miles) and some short branches, as well as a small piece of line on the Pacific coast. There are over 1,300 miles of private lines laid by the sugar companies. Nearly all the foreign trade of Taiwan passes through the ports of Keelung and Takao, both of which have artificial harbours. Over 90 per cent. of the exports go to Japan, which supplies over 80 per cent. of the most important imports. The chief exports are sugar, rice, tea, fruit (pine-apples and bananas), coal, camphor, flax, hemp and jute; the chief imports are oil-cake, wood, petroleum, opium and manufactured goods (cottons, iron goods, etc.).

HOKKAIDO (YEZO) <sup>1</sup>

Hokkaido, the northland of Japan, differs strikingly from the rest of Japan proper. Prior to the era of modern Japan, ushered in by the reign of Emperor Meiji (1868-1912), there were few Japanese on the island, and these were almost entirely confined to fishing villages along the southern coasts. 'Most of the island was the unprotected domain of Ainu tribes who supplemented hunting and fishing with some primitive agriculture.' The early attempts at settlements and agricultural development were not encouraging, despite the help of experts from America and Europe. The railway has eventually proved to be the essential pioneer, and to-day the population is not only concentrated along the railways but exhibits all stages from the pioneer fringe along the newer lines to the settled communities in older areas.

Topographically, in the small area of lowland available, Hokkaido resembles Japan proper. The south-western or Oshima Peninsula is structurally a continuation of the central ranges of Northern Honshu. Northwards the most extensive lowland is the Ishikari Plain, from which a narrow plain extends towards the northern tip of the island between the two north-south ranges which form its backbone. The structure lines of the Kurile Arc, associated with much vulcanity, cross these from east to west and from the central knob there is a radial drainage. The streams have built up considerable plains bordering the coasts and there is also an important development of marine terraces.

Climatically, the rough divisions drawn up for the first edition of this book seem satisfactory in that they parallel the agricultural regions recently established by Davis.

(a) Northern Hokkaido has not only bitterly cold or raw winters with a January average below 25° F., but has four months or more with mean temperatures below freezing.

(b) Western Hokkaido resembles Western Honshu in its winter snowfall, winter cloud and fog, clear and warm summers.

(c) South-eastern Hokkaido, with its moister and consequently cooler summers (often foggy just when sun would be valuable for ripening crops), is inimicable to arable farming.

<sup>1</sup> W. D. Jones, 'Hokkaido, the Northland of Japan', *Geog. Review*, vol. XI, 1921, pp. 16-30. D. H. Davis, 'Present Status of Settlement in Hokkaido', *Geog. Review*, Vol. XXIV, 1934, pp. 386-399. R. B. Hall, *Agricultural Regions of Asia, the Japanese Empire*, *Economic Geography*, vol. XI, 1935, pp. 40-43.

Davis's agricultural regions are similarly :

- (a) The northern or 'Mixed Farming Region', where rice occupies 25 per cent. or less of the cropped area and where oats occupy about the same area, followed by beans, potatoes, peas, rye, buckwheat and some wheat
- (b) The western or 'Rice and Oats Region', where rice is the leading crop—occupying up to 60 per cent. of the cropped land—with oats a close second.

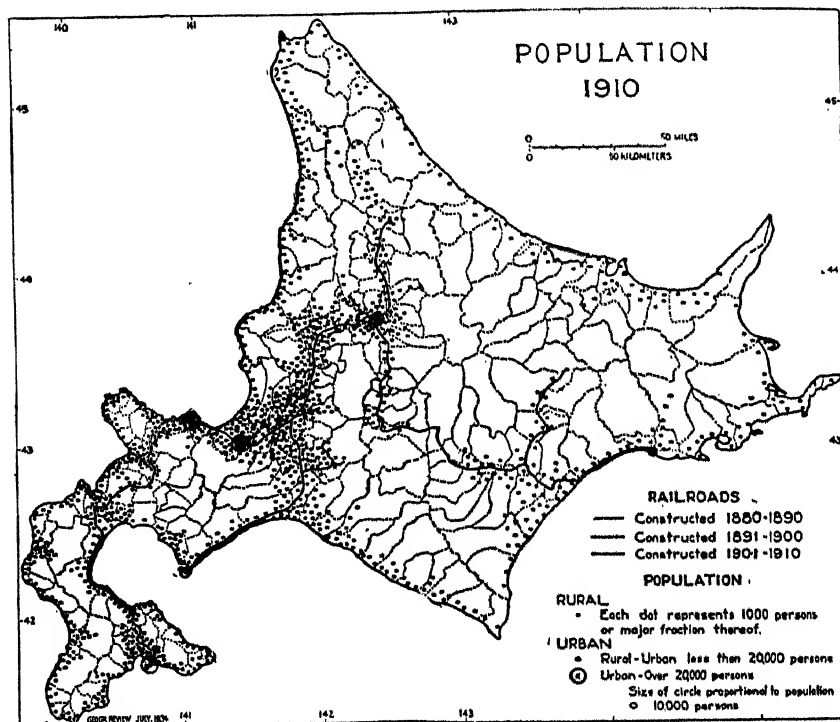


FIG. 321.—Settlement in Hokkaido, following the pioneer railways.

- (c) The southern or 'Stock-raising Region', where (owing to the climatic conditions of the summer) there is little crop production and where the rearing of horses is the leading occupation. Hokkaido has a quarter of a million horses against 35,000 cows, and horses are not only the chief draught animals and beasts of burden but are reared for the Japanese Army.

Hokkaido is still a frontier land. The land is still cheap, that the farms, with an average size of 12 acres, are four times



the area common in Old Japan. The northward extension of rice cultivation has been made possible by the perfecting of varieties that will mature in as short a frost-free season as 90 days. But much of the land—even the 14 per cent. available for crop production—is topographically unsuited to rice and the yields are low. The scattered patches of cultivation in Hokkaido contrast with the continuous culture of Old Japan.

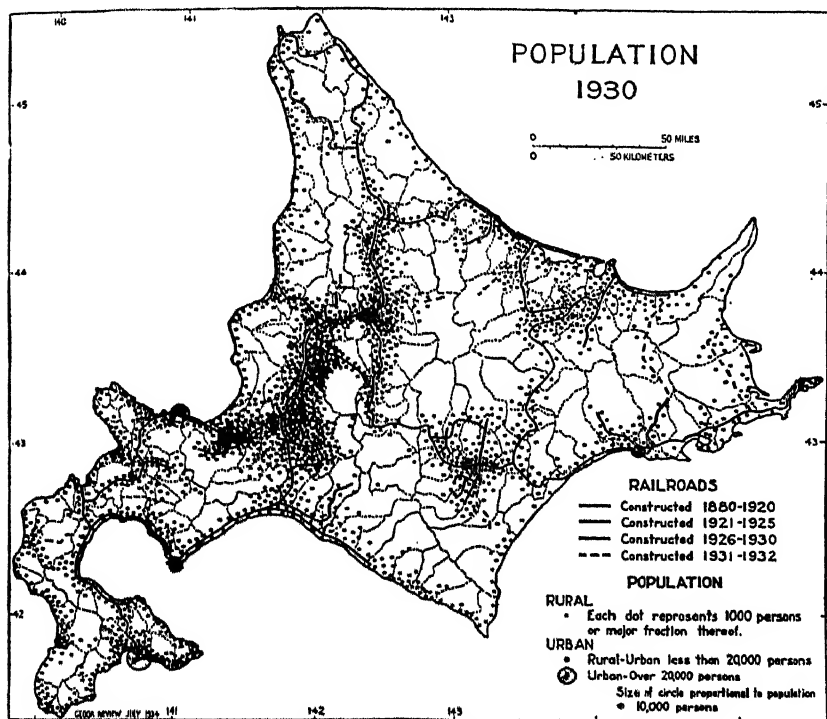


FIG. 322.—Settlement in Hokkaido, 1930.

A recent survey has placed the potential agricultural population at 3,000,000 against the existing 2,000,000.

D. H. Davis, in the paper already quoted, has demonstrated the really remarkable way in which settlement in Hokkaido has followed the building of railways. Two of his maps—for 1910 and 1930—are here reproduced. Lumbering is the first occupation—timber is still an important product; then the cut-over areas are prepared for agriculture; in the older settled areas such as the Ishikari Plain near Sapporo the forest has entirely disappeared. The aboriginal inhabitants, the Ainu, now number

only about 16,000—a number that is stationary or decreasing. By way of contrast the total population has shot up in a remarkable way :

1869 . . .	58,000	1910 . . .	1,609,546
1880 . . .	191,172	1920 . . .	2,359,183
1890 . . .	321,118	1930 . . .	2,812,342
1900 . . .	786,211		

The rate of immigration has now slowed down, urban development is more marked than rural and the Government looks to urban centres to support 3,000,000 or a total equal to that postulated for the land. Whether the coalfields will lead to industrial expansion is doubtful—unless it be for pulp and paper manufacture, smelting and small industries to supply local needs. The smaller towns are still essentially country market towns, the larger are either ports or railway centres. Sapporo, the capital, is a modern solid-built city—so different from many in the warmer southern islands—in the heart of the agricultural region of the Ishikari Plain and reached a population of 168,571 in the Census of 1930. Hakodate (197,252) has a good deep water harbour and is a coal and ferry port, but does not handle as much trade as Otaru (114,884). Muroran (55,857) is the port for Yūbari coal, and has iron and steel mills; Kushiro (51,584) is the lumber port of the south-east; Asahigawa (82,514) is an inland railway centre.

#### KARAFUTO (SOUTHERN OR JAPANESE SAKHALIN)

The southern half—south of 50° N.—of the island of Sakhalin was ceded to Japan under the Treaty of Portsmouth in 1905. It covers an area of 13,254 square miles and in the south is separated from Hokkaido by a strait 24 miles wide. Topographically the island consists of subdued mountain ranges with a north and south alignment. The main western range extends to the southernmost tip of the island, whereas the eastern range is interrupted by the wide Taraika Bay. In the north the Maifuchi Plain lies between the two ranges; in the south the Suzuya Plain.

The climate of Karafuto is against extensive settlement. In all parts there are at least five months with an average temperature below freezing, whilst in the north the mean *annual* temperature is below freezing. The sea-level temperature, below zero in January, may frequently rise to 90° F. in July. Northern Karafuto, which includes the Manchuli Plain as its only important area of low relief, is virtually a tundra inhabited by nomadic Gilyak tribes with herds of reindeer. Southern Karafuto, with

the Suzuya Plain, has land capable of cultivation—with potatoes, oats, rye, buckwheat, hay and vegetables. But only 0·7 per cent. of Karafuto is arable—2 per cent. only of the south—and less than a quarter of the population is engaged in farming. Grazing is relatively important.

The inhabitants include a small and dwindling number of aborigines—less than 2,000—and rather under 300,000 Japanese immigrants growing steadily in numbers. In recent years about a thousand families a year have been helped to settle.

Fishing is the oldest industry and by far the most important; the fishing is for herring, cod, trout, salmon, whilst crab are also valuable. Seaweed is collected for manufacture into fertilizer—the fate also of many of the herrings—whilst the crab is tinned for export to Europe and America.

Forests cover half the area, mixed stands of larch, *Abies* and *Picea* being the usual rule.

There are three fields of Tertiary coal and the output now exceeds half a million tons a year. Unfortunately for Japan, the resources of petroleum seem to be restricted to the northern or Russian half of the island, where both coal and oil are worked by the Japanese on concessions.

#### THE CHISHIMA OR THOUSAND ISLAND DISTRICT (THE KURILES)

The island arc of Chishima extends from Hokkaido to the tip of the Kamchatka Peninsula and consists of thirty-one volcanic islands. The two southernmost islands have coniferous forests and, as in Hokkaido, fishing villages are scattered along the coasts. The remaining islands are practically uninhabited, support but a tundra vegetation and are fog-bound during much of the summer.

#### CHOSEN (KOREA) <sup>1</sup>

The important peninsula of Korea is nearly as large as the main island of Japan proper and has an area of 85,228 square miles. In the south it is separated from Japan by a strait of only 120 miles wide, with the historic island of Tsushima forming a stepping-stone between the two. On the east coast the Gulf of Gensan and the river Tadong divide the peninsula into Northern and Southern Korea. The northern boundary

<sup>1</sup> J. W. Baylor, 'The Geography of Chosen', *Econ. Geog.*, Vol. VII, 1911, pp. 238–251. R. B. Hall, 'Agricultural Regions', *Econ. Geog.*, Vol. XI, 1915, pp. 44–52. J. W. Coulter and B. Bong Hee Kim, 'Land Utilization Maps of Korea', *Geog. Review*, Vol. XXIV, 1934, pp. 418–422. *Japan-Manchukuo Year Book*, 1935, Chapter XXXV.

is formed by the Tumen and Yalu Rivers and White Mountain.

The mountainous backbone of Korea lies nearer the east coast than the west; the rivers flowing into the Yellow Sea are longer than those of Japan and some are navigable for considerable distances, especially at flood-tide. The tides on the west coast are very high—even as much as 33 feet. The south

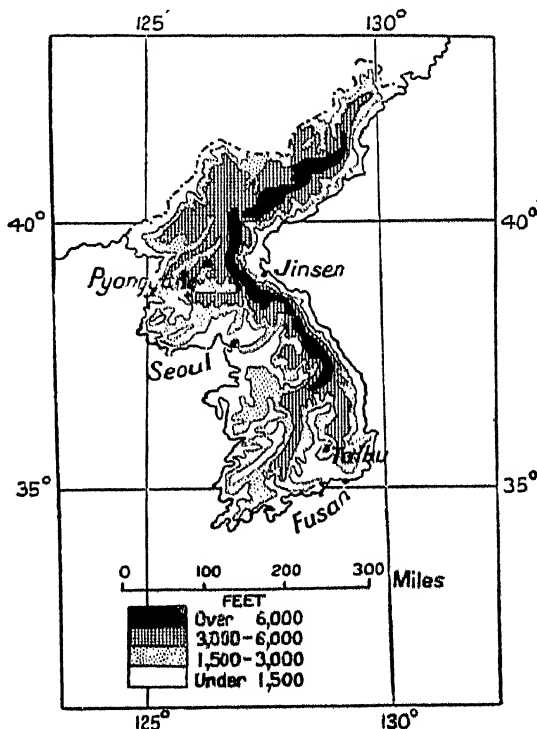


FIG. 323.—Physical map of Korea.

western part of the peninsula is the best land and is generally well cultivated.

**Climate.**<sup>1</sup> Broadly speaking, the climate of Korea is con-

<sup>1</sup> J. D. Van Buskirk, 'The Climate of Korea and its probable effect on Human Efficiency', *Trans. Korea Branch Roy. Asiatic Soc.*, Vol. X, 1905. See also Fig. 304, p. 595, for Thornthwaite's classification of climate. Jones and Whittlesey recognize three climatic regions: (a) north-east with heavy winter snowfall; (b) south, from Jinsen and Seoul southwards, with a nine months growing season and winter sub-zero temperatures rare; (c) north-west continental and resembling the neighbouring parts of Manchuria.

comparable with that of Northern China. Practically the whole country has at least one month with a mean temperature below freezing, Seoul has two and the Manchurian border has five. The east coast faces the northerly winds, which blow across the sea from the neighbourhood of Vladivostok, and receives a few inches of rain in winter. But the normal rainy season is summer. Korea shares with Japan and the Yangtze Valley the early rainfall maximum in June (Bai-u or Plum rains of Japan) and in the south of Korea there is a distinct short season of rains in April. The April rains are important since they furnish water to irrigate the rice-fields, and make this part of Korea ideal paddy land.

**Natural Vegetation.** The natural vegetation of Korea is forest: in the south resembling that of Southern Japan with pines mixed with oaks, walnuts, etc.; in the north resembling that of Northern Japan with conifers such as *Chamaecyparis*, *Larix*, *Abies*, *Pinus*, as well as birch. Forests would normally cover 70 per cent. of the surface, but as a result of reckless felling and neglect the mountains of Central and much of Southern Korea are bare. The Government has been very active in re-forestation.

Before dealing with agriculture and other industries, it will be desirable to outline the history of Korea in order that the present position may be intelligible.

**Historical.** The history of Korea has been very largely the natural result of the geographical situation of the country, with China on the west, Japan on the east, and Russia on the north. Herself the possessor of advantages, especially of good natural harbours, coveted by her neighbours, the history of Korea has been the chequered history of a typical buffer State.

When the Chinese statesman, Ki-tze, invaded Korea in the sixth century before Christ, it is said that he found the country occupied by cave-dwellers in a state of savagery, and little is known of the early history of the Koreans themselves. But for more than two thousand years Korea wavered between a state of independence and a state of suzerainty under China or Japan. The country was repeatedly invaded from the north, by China under both the Chinese and Manchu Dynasties, and by nomadic tribes. In 1592 Japan attacked Korea with an army of 300,000 men as part of a general campaign against China. These various invasions and raids, coupled with the prevalence of piracy in Korean waters, led Korea for several centuries to adopt a policy of absolute national seclusion, so that Korea came known throughout the world as the Hermit Kingdom. Whether Korea was a vassal State of China was never quite

decided. When it suited the Koreans to claim the protection of China they did so ; when China sought to make its suzerainty effective the Koreans claimed that the annual tribute was paid on sentimental grounds in perpetuation of an ancient custom. But at the same time China disclaimed any responsibility for the acts of Koreans which gave rise to the French and American punitive expeditions of 1866 and 1871. This state of affairs was particularly irritating to Japan, and when, in 1875, a Korean shore-battery fired on a Japanese warship without provocation Japan took the opportunity of defining and establishing Japanese-Korean relations. The Treaty of Kwangha, 1876, provided for mutual trade, the mutual opening of ports and the recognition by Japan of Korean independence. But China continued to interfere in Korea's domestic affairs and in 1894 Korea asked China's help in subduing a serious rebellion. Chinese troops were sent and Japan sent a bodyguard to protect her minister at Seoul. Japan's suggestion that the Chinese and Japanese troops should work together was rejected and the Sino-Japanese War of 1894-95 became inevitable. Japan was completely victorious and the Treaty of Shimonoseki recognized the absolute independence of Korea, but the intervention of France, Germany and Russia compelled Japan to withdraw her troops from the Chinese peninsula of Liaotung. But what these European powers prevented Japan from doing they immediately proceeded to do themselves and established colonial outposts on Chinese soil. Theoretically an independent Korea protected Japan from the aggression of Russia. But Russia proceeded to develop the powerful naval base of Vladivostok, occupied Port Arthur on the Liaotung Peninsula, dominated Manchuria and formulated obvious designs on Korea. In the meantime Japan quietly improved her land and sea forces. In 1903 and 1904 Russia showed her unwillingness to effect an amicable settlement with Japan and to guarantee Korean independence. The Russo-Japanese War therefore followed and resulted in the complete victory of Japan. According to the declaration made in 1905 the 'relations of propinquity have made it necessary for Japan to take and exercise, for reasons closely connected with her own safety and repose, a paramount interest and influence in the political and military affairs of Korea'. The protectorate thus established was unsatisfactory. The assassination of a United States citizen and of the Japanese Prince Ito induced certain classes of Koreans to petition for annexation, which was finally carried into effect on August 29th, 1910. From 1910 to 1945 Japan ruled Korea with a fair but harsh and inflexible military rule. The Independence Movement of 1919 was stamped out.

with a cruel but effective vigour, but it marked the dawn of a new era for Korea. Under the humane and sympathetic governorship of Viscount Ito, Korea has made amazing economic and social progress. In the words of Mr. Alleyne Ireland, from whose book the above account is mainly taken, 'Korea is to-day infinitely better governed than it ever was under its own native rulers, better governed than most self-governing countries and better governed than most British, American, French, Dutch and Portuguese dependencies'.<sup>1</sup>

**Population.** According to the Census of October 1st, 1925, the total population of Korea was 19,519,927, an increase of 2,258,720, or 13 per cent., since 1920. At the end of 1932 the numbers had increased to 20,600,000. Until the war of 1904-5 Japanese settlers only numbered 40-50,000; they now constitute 2.5 per cent. of the total population (523,000 in 1932). There are about 40,000 foreigners, most of whom are Chinese. It will be seen that Japanese settlement in Korea has made rapid strides in recent years, but a large proportion of the Japanese are in the towns. Keijo (Seoul) has a population of 355,426 (a quarter Japanese, the usual

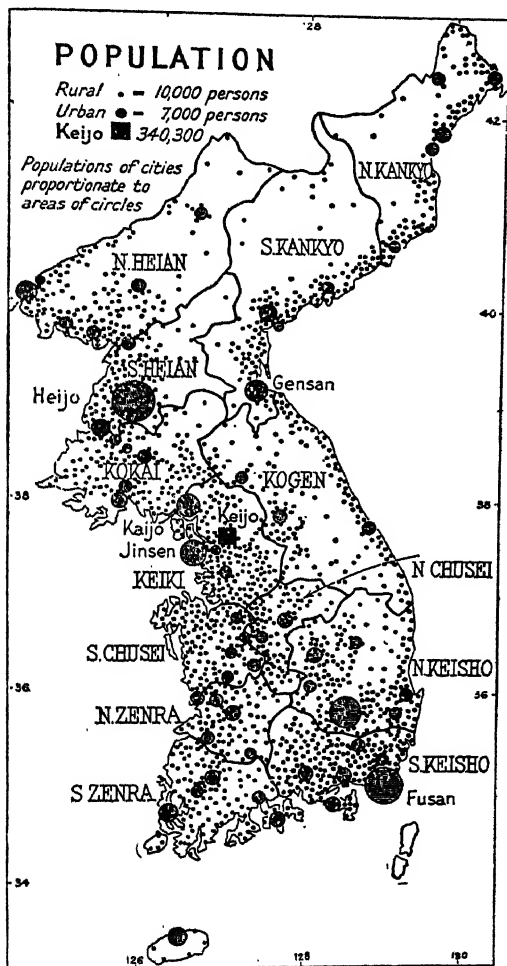


FIG. 324.—Map showing the population of Korea.

(By J. W. Coulter and B. B. H. Kim.)

<sup>1</sup> *The New Korea* (E. P. Dutton & Co., New York), 1926.

proportion for other towns) (1931); Pyong-yang (Heijo) 137,000; Fusan, 130,000; Taiku, 101,000; Jinsen, 64,000.

**Occupations.** Between 80 and 85 per cent. of the inhabitants of Korea are engaged in farming—especially of rice, which is the staple food. Fishing is now an important subsidiary occupation; the west and south coasts have numerous and excellent harbours though suffering from an exceptional tidal range—exceeding 30 feet in places. These marked tidal movements combined with the conditions resulting in the meeting of cold and warm currents off the coasts are responsible for the wealth and variety of the catch. Although the value of the fishery products has increased nearly ten times since the annexation, largely through the introduction of modern gear and methods—including deep-sea fishing—by the Japanese, the Japanese themselves take little part in either fishing or agriculture. Only 10 per cent. of the Japanese in the country are so engaged. Mining and forestry are of limited importance. Manufacturing is still unimportant, though the Koreans are skilful and textiles may become significant; most of the towns are collecting or distributing centres for agricultural produce, so that the number and size of the towns bear a direct relationship to the importance of agriculture.

**Agriculture.** Arable land covers about 11,275,000 acres (1932), and although there has been little change in the total area over ten years, the use has changed considerably. Rice occupies 4,200,000 acres—an increase of 125,000 acres in five years—and a quarter of the paddy land now yields a double crop. The fields of Korea are small, owned by the wealthy and farmed by peasants who have a much lower standard of living than the Japanese—one reason why Japanese farmer-immigrants are few in Korea and why Korean immigration into Japan creates a serious problem—and the Japanese Government is making strenuous efforts to modernize the agricultural system. Modern farms are being established; the use of legumes and fertilizers are being encouraged. The lay-out of existing paddy-fields is being improved; dry fields and marshes are being converted into paddy land. It is estimated that nearly 2½ million acres of land, comprising hillsides, marshes and beaches, could be made available by terracing or draining.

The chief crops are rice, barley, Italian millet, wheat, soy beans, and red beans. There are also such special crops as cotton, tobacco, hemp and ginseng. The cultivation of fruit has lately produced excellent results. Radishes are popular for making 'Kimchi', an important item of the Korean menu.

The rice crop for the years 1922-27 averaged between



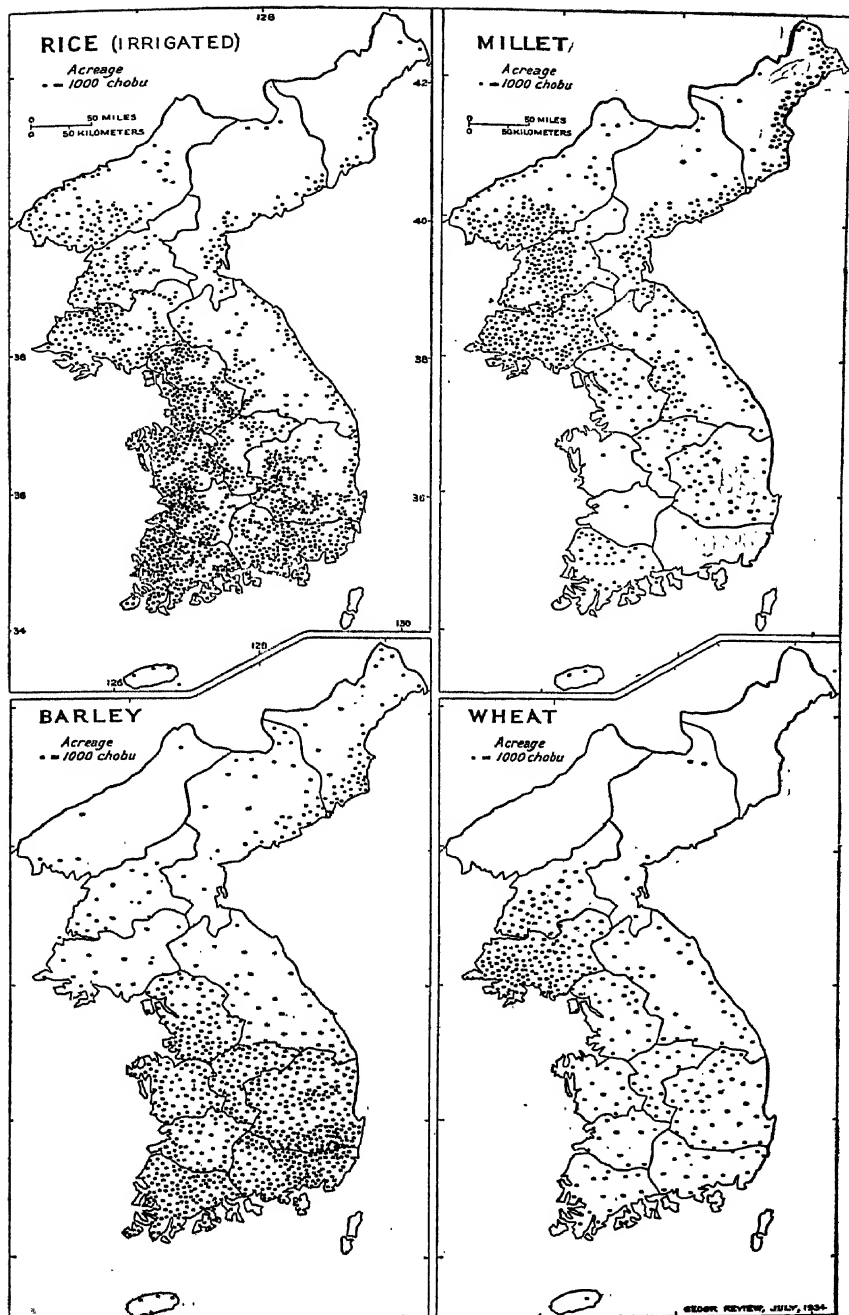


FIG. 325.—Maps showing the distribution of the chief crops of Korea.  
(By J. W. Coulter and B. B. H. Kim.)

and 80 million bushels, for 1928 to 1932 about 80 million, reaching a high peak of 95 million in 1930. Of these 40 to 50 per cent. is available for export to Japan and the quantity now exported is ten times what it was in 1910. In 1932 production of barley was 44 million bushels ; of soya beans 10 million bushels ; of wheat 9 million bushels ; of millet 28 million bushels. The production of American upland cotton was 175,000,000 lb. and of native cotton 55,000,000 lb. ; of apples 36,000,000 lb. and of pears 25,000,000 lb.

The importance to Japan proper of the surplus agricultural products is, of course, immense, but the recent agricultural development of the country is almost entirely due to Japanese enterprise. It was a group of Japanese who first experimented with cotton in 1905 ; until recently fruits now produced in excess and of fine quality, because of the drier climate compared with Japan, were imported from China and Japan. In connection special interest attaches to the improvement of sericulture under Japanese influence, as shown in the following table :

PRODUCTION OF COCOONS IN KGMS.

1909-13.	1924.	1925.	1931.	1932.
715,645	7,772,782	9,088,901	19,000,000	20,000,000

Live-stock is raised as a by-product of agriculture ; in 1932 there were over 1½ million cattle and 1¼ million pigs. Cattle are well known for their size and quality and especially those reared in Hamkyong, Northern Korea, and there is a large export to Japan.

An interesting product of Korea is ginseng, a medical herb highly valued by the Chinese. The cultivation is a Government monopoly. Tobacco (45,000,000 lb. in 1932) is another monopoly.

**Minerals.** Korea is rich in minerals and the total value has quadrupled in the past twenty years, despite the post-war slump. The chief minerals are gold, iron and coal. The output of the gold (over 9,000,000 grams since 1931) is from two foreign-owned mines, the Unsan mine and Suian mine, both controlled by American interests. Whanghai is the centre of iron-mining, the output of pig-iron averages over 150,000 tons. The Pyongyang Colliery is famous as working the only rich anthracite mine in Japanese territory. The output of coal exceeded a million tons for the first time in 1932.

**Natural Regions of Korea.** The crop distribution maps here reproduced from Coulter and Kim's paper suggest wide variations in agricultural production with a millet-wheat-bean region in the north-west, and a rice-barley region in the south. A division of the country into five regions has been proposed by Baylor; these are shown with modifications in Fig. 326.

- (1) *The Central and Northern Mountain Region.* This is a sparsely inhabited, wild and inaccessible region of mountainous country with peaks rising to over 8,000 feet and the lofty Kaima plateau passing southwards into the Taihoku Range. The superstitious natives, living in two- or three-roomed clay huts with thatched roofs, attempt a little cultivation in the valleys. The

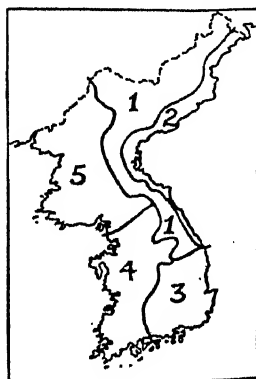


FIG. 326.—The natural regions of Korea, altered from Baylor.

region has largely been despoiled of the forests it should possess and presents barren foothills where larch should flourish.

- (2) *The Eastern Coastal Strip.* This narrow, isolated region is inhabited along the coast by villagers whose main interest is in fishing from tiny boats by primitive methods. The tides on this coast are small, but harbours suitable for large craft are absent. There is a narrow belt of arable country behind the coastal tract where rice and millet are the staples.
- (3) *The South-eastern Silk Area.* This comprises the Naktong Basin and its surrounding foothills and is one of the areas where sericulture has made great strides. Having Fusan as its outlet and enjoying excellent communications, further development may be prophesied for this region.

- (4) *The South-western Agricultural Basins.* The western agricultural basins of Chosen are by far the most important parts of the country. The central Han basin, radiating in three directions from the mouth of the river near Jinsen, has long been the economic and political heart of the peninsula. This river separates roughly the south-western from the north-western basins. The south-western region is, like the south-east, a two-cropped region. October is not only the month of the harvest but is marked by great activity in the plowing.

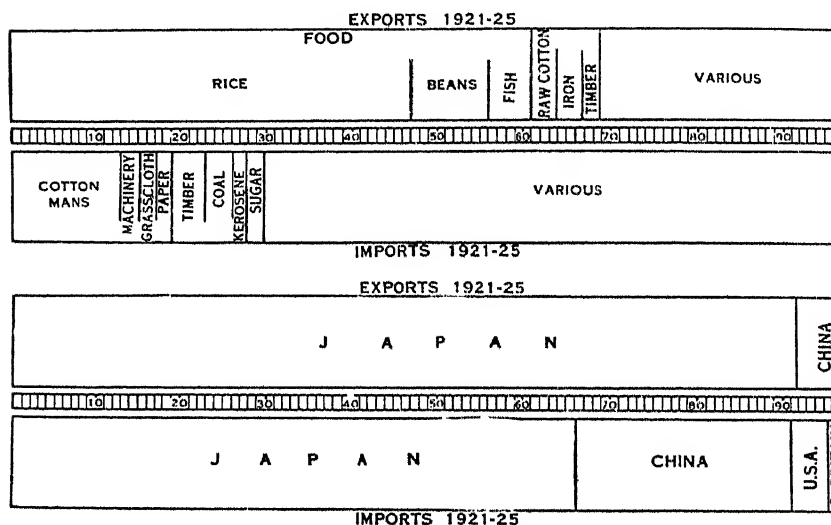


FIG. 327.—The trade of Korea, emphasizing the importance of this possession to Japan. The former trade with China is now trade with Manchuria.

ing of the rice lands and the sowing of large quantities of barley, and some wheat to be reaped in June and July when the monsoon rains break and prepare the land for transplanting the little rice plants. Sericulture and the growing of mulberry trees are carried throughout the western basins.

- (5) *The North-western Agricultural Basins and the Mining Regions.* North of Seoul the severity of the winter makes autumn or fall sowing either impossible or unwise; thus the land is single cropped. There is little barley but much wheat, millet and soy beans, with a relatively smaller quantity of rice. The mining activities occur as enclaves in this region.

Enough has been said to indicate that Korea is capable

supplying considerable quantities of the raw materials of which Japan has need ; enough has also been said to indicate that Korea is not being 'exploited' by the Japanese, but being well governed and developed to the lasting benefit of the Koreans themselves.

**Commerce.** The bulk of the commerce is with Japan (its nature is indicated diagrammatically). The former large trade with 'China' was actually with Manchuria. To the exports should be added the recent large one of raw silk—now second to rice.

Fusan is the oldest and largest port of Korea and it has recently been modernized and has excellent railway facilities. Jinsen is the second port and a new dock now accommodates two vessels of up to 4,500 tons. In 1933 there were over 1,900 miles of railway and 10,300 miles of roads, but much of the country is still inaccessible and transport in the interior is by porters, pack-horses or oxen.

## THE JAPANESE SOUTH SEA ISLANDS

After the World War Japan was given the mandate over the former German possessions of the Mariana, Marshall and Caroline groups which had early been occupied by a Japanese naval force. There are nearly 1,500 islands, islets and reefs scattered over a wide area of the Pacific Ocean—between 0° and 22° N. and 130° and 175° E. The total area is less than a thousand square miles and the population about 50,000 natives—divided between the two main tribal groups, the Kanakas and Chamorros. The total population had reached nearly 70,000 by 1930 and over 80,000 by 1933 owing to the influx of Japanese (over 30,000 in 1933). Nearly half the Japanese are in Saipan Island, where they are engaged in sugar-cane cultivation or sugar manufacture. From the Augaur Islands is an important production of phosphate—about 60,000 tons annually. Copra is also an article of export.

## CHAPTER XI

### ASIATIC RUSSIA

PRIOR to the Revolution of 1917 the Russian Empire included practically the whole of Asia lying to the north and west of the great central mountainous triangle, together with considerable tracts of the latter itself. The name Siberia (Sibir), which was originally the Russian name given to the settlement of Isker on the Irtysh, came gradually to be applied to the whole vast stretch of Asiatic Russia. The southern and western tracts have long been known as Russian Turkistan—Inner Tartary of older geographers—and were frequently excluded from the area covered by the loose term Siberia, as also some of the mountainous tracts bordering Mongolia.<sup>1</sup> Since the Russian Revolution of 1917 a more restricted meaning has been applied to the term Siberia. In this chapter it is proposed to consider all the territory which, before the War, formed the Asiatic portion of the Russian Empire. We shall consider it in two portions:

- (a) Siberia, from the Arctic to the Mongolian-Manchurian frontier.
- (b) Russian Turkistan or Russian Central Asia.

### SIBERIA

Siberia lies between the inhospitable waters of the Arctic Sea on the north and the almost equally inhospitable mountains and deserts of Central Asia on the south. Its outlets are through European Russia on the west and across the former coastal ranges to the Bering and Okhotsk Seas on the east. Siberia's chief drawback is its inaccessibility; its other drawback is its vast size. Five thousand miles from east to west, and on the west as much as 2,300 miles from north to south, it has an area of about 5,200,000 square miles. Even allowing for the doubtful value of enormous tracts, there is enough left to justify the statement that Siberia has the largest area in the temperate zone.

<sup>1</sup> Siberia is interpreted in this sense in the Admiralty *Handbook of Siberia and Arctic Russia*, 1918.

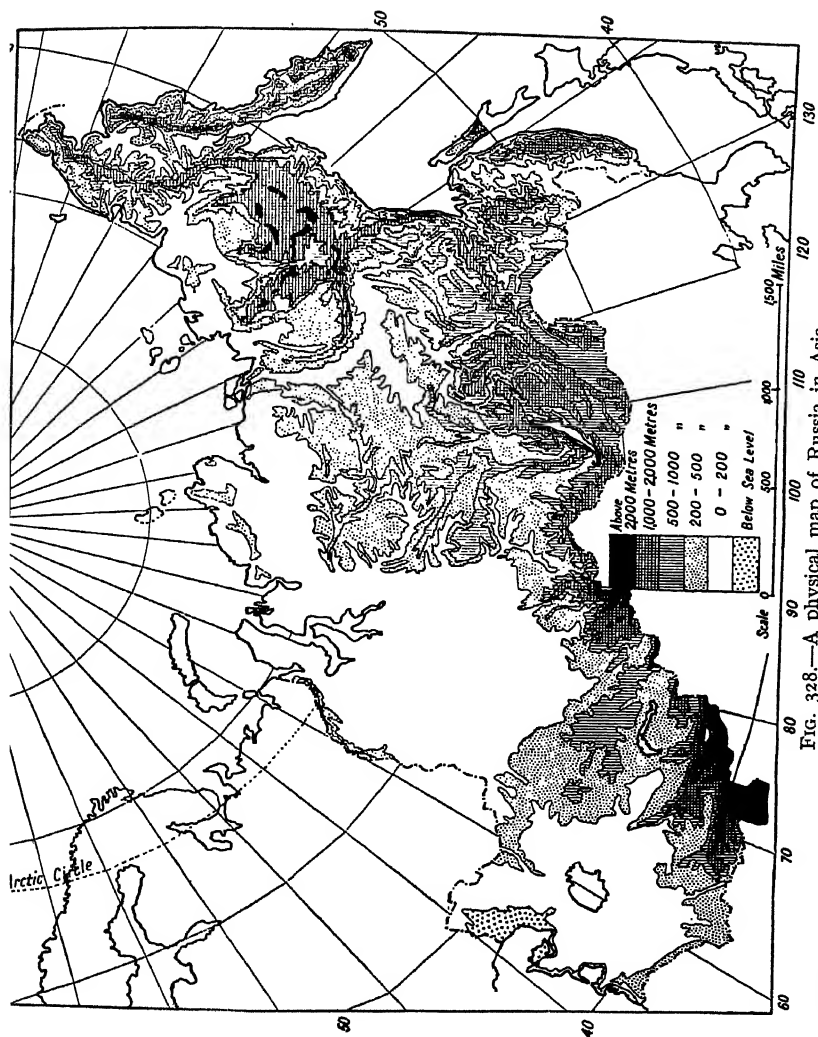


Fig. 328.—A physical map of Russia in Asia.

The central and western portions are taken from *The Times Atlas*, but the eastern portion was specially drawn by Miss E. Sandcock, B.A., for this work, to incorporate the results of Obrutchev's recent discoveries.

zone still awaiting development. There are two main problems awaiting solution: one is the problem of low-cost transport to the world's consuming centres; the other is the augmentation of the population. Given these, Siberia has immense capabilities for the production of all types of temperate agricultural products: an enormous area of soft-wood forest at present untouched, an immense mineral resources at present almost unexplored. The present population (Census of 1926) is about 15,000,000; the farming land for their adequate development requires another 20,000,000 acres. Double this number are needed eventually for the development of trade, transport and manufactures. Siberia before the inc



FIG. 329.—The physical divisions of Siberia.  
(After Schultz.)

dence of the First Five Year Plan (1928–32) might have been compared with Canada of a few decades ago, but without the features of accessibility and ready markets which have favoured the very rapid progress of the Canadian prairies and Far West.

**Orography.**<sup>1</sup> Siberia may be divided primarily into Western, Central, and Eastern Siberia.

<sup>1</sup> An excellent geography of Siberia, from which much that follows has been derived, is Arved Schultz's *Sibirien, eine Landeskunde* (Breslau: Hirt, 1923). Another important work is P. W. Danckwort's *Sibirien und seine wirtschaftliche Zukunft: Ein Rückblick und Ausblick auf Hand und Industrie Sibiriens* (Leipzig and Berlin: Teubner, 1921). Since the first edition of this book was published there has appeared the excellent volume in the *Géographie Universelle* (Vol. V) *États de la Baltique, Russie* by P. C. d'Almeida (1932). See also article 'Russia', *Encyclopædia Britannica*, 14th Edition. A valuable source of information concerning recent development is N. Mikhaylov's *Soviet Geography* (Methuen, 1935).



Western Siberia, from the Urals on the west to the Yenisei River on the east, comprises :

- (1) A huge plain on the north, roughly the basin of the Ob and its tributaries (West Siberian Lowlands).
- (2) The Kirghiz Uplands or foldlands, lying to the south of the plain, and passing westwards into the Turgai Plateau.
- (3) The Altai and Western Sayan mountain region, on the Chinese borders.

Central Siberia, from the Yenisei River on the west to the Lena River on the east, comprises :

- (4) The North Siberian Plain, along the borders of the Arctic Ocean.
- (5) The Middle Siberian Plateau—the Angaraland of the geologists.
- (6) The Old Shield of Asia, a mountainous region of old rocks around Lake Baikal, including both the border ranges and also portions of the Central Asian plateaus (Vitim Plateau and Yablonoi Mountains).

Eastern Siberia lies east of the Lena River and comprises :

- (7) The mountain lands of Eastern Siberia, which include several great festoons of mountains, about which little is known—Stanovoi Mountains, Verkhoyansk Mountains, Kolyma and Anadyr Mountains, as well as the mountains of the Maritime Provinces.<sup>1</sup>
- (8) The peninsula of Kamschatka.
- (9) The peninsula of Chukotsk.

Figs. 328 and 329 have been drawn to show side by side the actual topography and these physiographic divisions.

**Structure.** It must be admitted that the physiographic regions just enumerated are based partly on topography, but primarily on the structure which is reflected in the topography. If we examine the tectonic map of Siberia given by Obrutshev,<sup>2</sup> we find he distinguishes the following geomorphological regions :

Western Siberia :

- (1) West Siberian Lowland.<sup>3</sup>
- (2) The Kirghiz Steppelands.

<sup>1</sup> That much remains to be learnt of this region is evidenced by the discovery of S. V. Obrutshev in 1926 of a hitherto unknown range rising to heights of 10,000 feet, which forms an inner arc parallel to the outer arc composed of the Verkhoyansk-Kolymsk-Anadyrsk range. For later formation (with map) see Obrutshev, *Geog. Jour.*, Vol. LXXXVI, 1935, p. 422-40.

<sup>2</sup> W. A. Obrutshev, 'Geologie von Sibirien' (Berlin: Borntraeger, 1926).

<sup>3</sup> See a note on the structure of this plain in *Geog. Review*, Vol. XVII, 27, pp. 494-5.

(3) The Altai-Takbagatai.

Central Siberia :

(4-5) Angaraland.

(6) The Old Shield of Asia.

Eastern Siberia :

(7) Verkhoyansk-Kolyma Region.

(8) Peripheral Tracts to the east of the Old Shield, including Kamschatka, Sakhalin and the ranges of the Maritime Provinces.

In view of the very great importance of Obrutschev's work on the tectonics of Siberia an attempt has been made to reproduce the main features of his tectonic map.

**Climate.** The climate of the whole of Siberia is essentially continental. So much prominence has been given to the Siberian winter that some common misconceptions must be dealt with. The winter is very long and very cold, but the air is dry<sup>1</sup> and bracing, and the skies cloudless. Precipitation in the winter is but slight, so that the snowfall is measured by inches rather than feet.

In winter the 'cold pole' of the earth is located in Eastern Siberia. The mean temperature of Verkhoyansk in January is  $-59^{\circ}\text{F.}$ ; in February, 1892,  $-90^{\circ}\text{F.}$  was recorded, this being the lowest reading ever taken on the surface of the earth. It may be that these extremely low temperatures belong only to valleys in which the cold air collects, and neighbouring hills may be much warmer. From this cold pole there is a steady increase in temperature in all directions. The high-pressure centre which is largely the result of the extreme cold lies farthest to the south, and a wedge of high pressure extends through Western Asia and Eastern Europe roughly along latitude  $50^{\circ}\text{N.}$  This wedge of high pressure is a well-known wind divide. To the south of it (in Turkistan) the winds are north, north-east and east, very cold and dry. To the north of it the winds are west and south-west, and the ameliorating influences of the North Atlantic thus penetrate to the north-west of Siberia. It is these winds which bring the winter cyclones, responsible for the small snowfall of Northern Siberia.

In summer the whole of Siberia is comparatively warm and the isotherms run roughly east and west except where they curve suddenly southwards on nearing the Pacific Ocean. Siberia in summer comes under the influence of the low-pressure system

<sup>1</sup> Strictly speaking, the relative humidity is as high as it is in the winters of England, but the temperature is so low that the absolute humidity is very low. When the air comes in contact with the human body it is greatly heated, and its relative humidity drops, so that as far as man is concerned, it is physiologically dry.

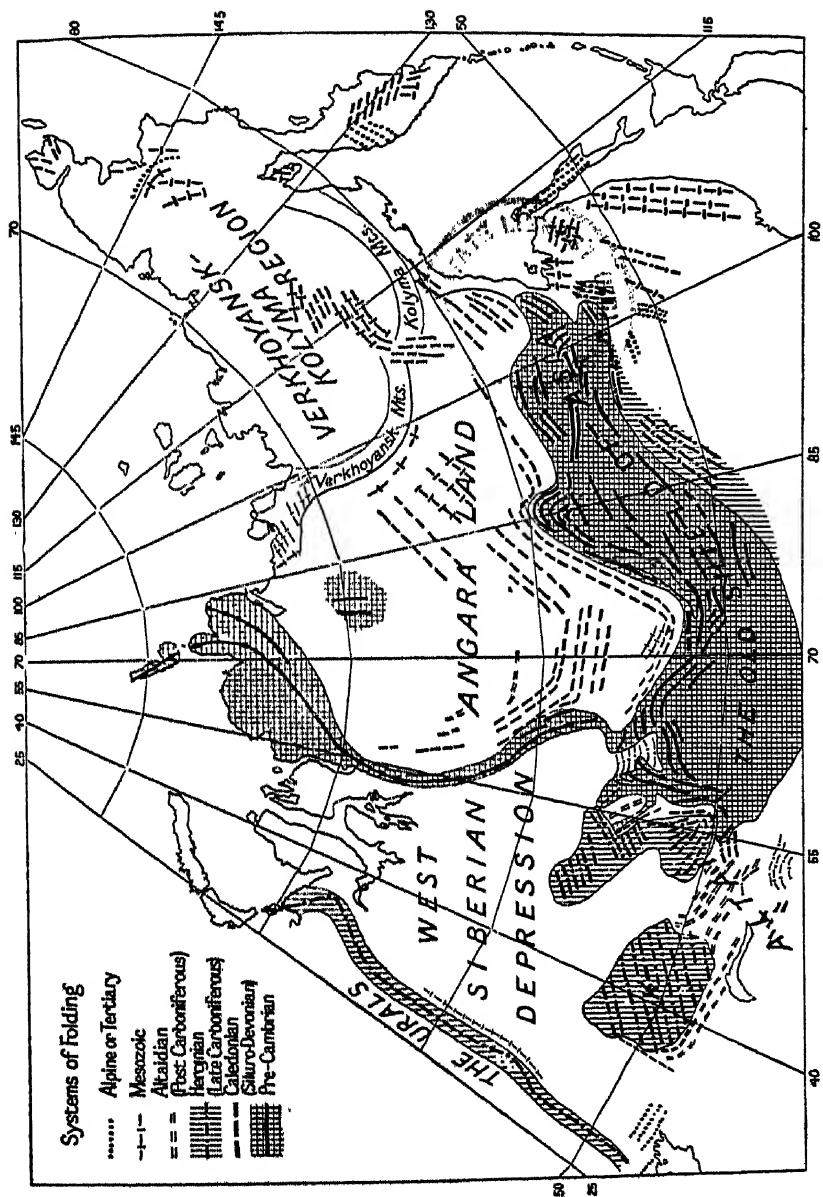


FIG. 390.—The structure of Siberia, according to Obrutshev.

of Central Asia, but the pressure gradient is gentle, and the winds, which are westerly, are light.

Over the whole of Siberia the precipitation is light. Over most of the country it is between 10 and 14 inches; dropping to less than 10 inches along the northern coasts and in the arctic south-west; rising to 20 inches and over on the Altai Mountains and in the Maritime Provinces of the East. More than half the precipitation is in the summer months—June, July and August being the wettest months. This is important because the moisture is available for crops.

There are two factors in operation in Siberia which have important influence on climate. One is the influence of the

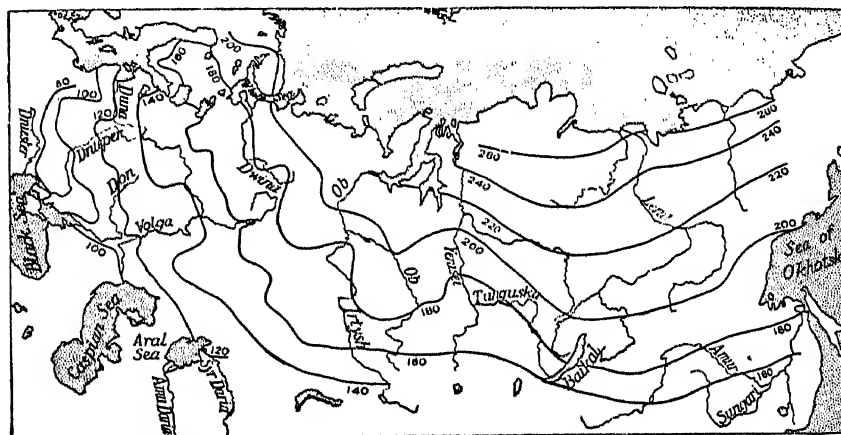


FIG. 331.—Lines showing the mean number of days the rivers are ice-bound each year in Asiatic Russia.

bodies of water as Lake Baikal, which cause a marked amelioration of winter cold and a lowering of summer temperature. The other is the character of Siberian rivers, which, owing to the general northern slope, flow but sluggishly, and in spring overflow the banks owing to the ice which at that season still blocks the mouths and lower courses. This gives the country a far more humid aspect than one would expect judging by rainfall alone.

The warm summers permit agricultural operations to be carried far to the north in Siberia. The only country whose climatic conditions are in many ways comparable with those of Siberia is Canada. As is well known, one of the great problems in Canadian agriculture is the necessity for extending agriculture northwards. The critical line, which limits farming in the Prairie Provinces, is that of 110 days of growing season, in

10 days with a temperature of 50° or over. Experiments in Canada are directed largely towards producing a wheat which will mature with a growing season of 100 days or even less. The Russians are fully alive to the problem and under the First and Second Five Year Plans numerous agricultural research stations were established in the far north. At present sufficient data do not exist to enable the line of 100 days above 50° F. to be drawn. The trend of the isotherms for the one hottest month does not really affect the problem. In July temperatures of 50° F. and over have been recorded even in the Tundra.

The freezing of Siberian rivers is a most important factor

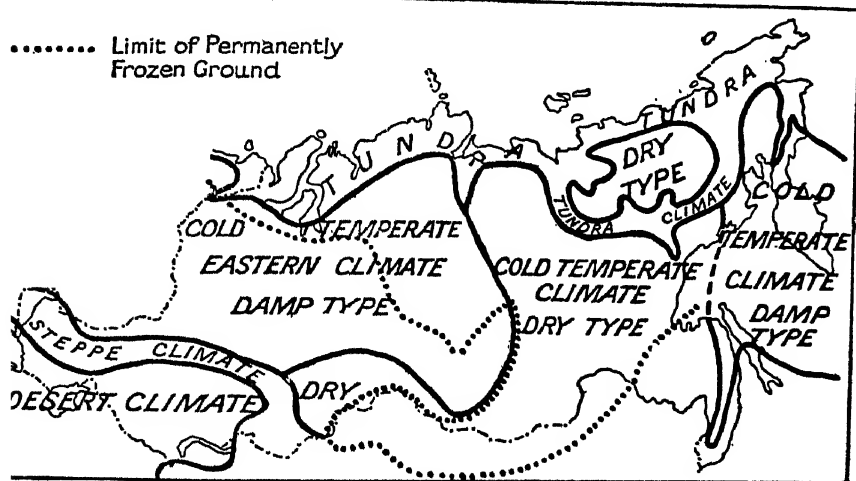


FIG. 332.—The climatic divisions of Siberia.

(After Schultz.)

For a more accurate delineation of permanently frozen subsoil, see d'Almeida, *op. cit.*, Fig. 45.

the life of the people. In the whole of Siberia the rivers are frozen for at least five months; in the extreme north they only flow for about three months. Most of the rivers are frozen solid. The north coast of Siberia is ice bound for most of the year: the permanent Arctic ice nearly reaches Taimyr Peninsula (see Chelyuskin).<sup>1</sup> Nikolaievsk, at the mouth of the Amur, is blocked for 220 days of the year, Vladivostok from the middle of December to the beginning of April. Lake Baikal is frozen 4½ months from December.

*Climatic Regions of Siberia.* Several schemes for climatic divisions of Siberia are in common use. The broad one given

<sup>1</sup> The seaway along the Arctic Coast is usually open for a short time each year. For example, two vessels in each direction made the passage in 1935.

in Part I of this book divides Siberia into—Tundra, Cold Temperate, Temperate Continental, and Temperate Desert, and has the advantage of coinciding with the main vegetation regions (Tundra, Coniferous Forest, Steppe, Desert). Under this scheme the Cold Temperate Climate may be divided into the climate of Eastern Siberia with great extremes (Feuchtwinterkaltes Klima of the Germans), and that of Western Siberia and the Pacific Coastal Strip (Wintertrockenkaltes Klima).

Kendrew distinguishes the same four primary types, and divides the Coniferous Forest or Cold Temperate Belt into three. His classification is as follows:

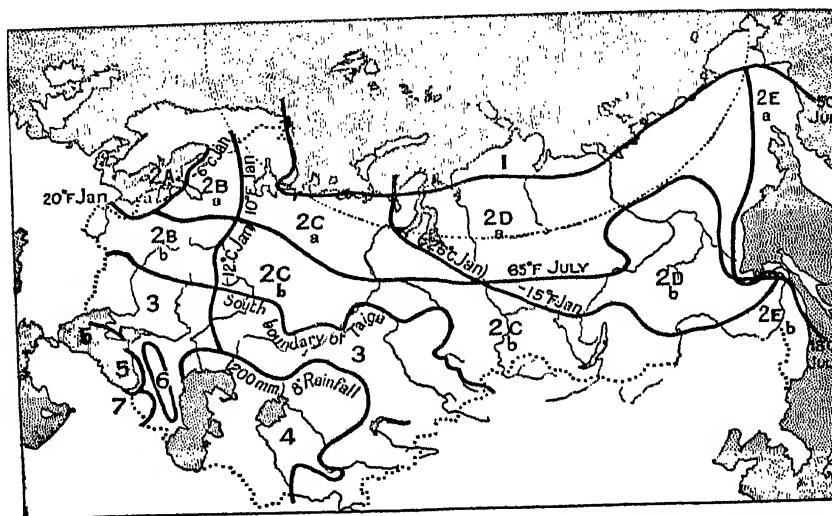


FIG. 333.—The major climatic regions of Asiatic Russia, according to Kendrew.

1. The Tundra Climate is characterized not so much by its winters—those of Central Siberia are far colder—as by its summers. The ground is frozen hard most of the year and the surface thaws for a few months in summer, and is water-logged. The precipitation is small, but the air is cold and raw.

2. The Cold Temperate or Coniferous Forest Climate has a cold winter, but a warm summer. It includes:

- (a) West Siberia with very cold winters (January between  $-15^{\circ}$  F. and  $10^{\circ}$  F.). Rainfall 8–16 inches—less in the north than in the south. The summers are cooler in the north (less than  $65^{\circ}$  F.) than in the south. (2Ca and 2Cb of Fig. 333.)

- (b) Central Siberia with the coldest winters known anywhere and an extreme range of temperature. The air is dry and clear in winter, the sky less cloudy than in West Siberia. The rainfall is also less and again decreases from south to north. (2Da and 2Db.)
- (c) East Coastal Siberia with a damp, cloudy, cool summer and much fog and drizzle. The winters are not as cold as in the interior. Strong north-west winds make the climate more trying than in the interior. (2Ea and 2Eb.)
3. The Steppe Climate (Temperate Continental) has a rainfall of 8-16 inches, falling mainly in spring and early summer heavy thunderstorms, so that the run-off is excessive, and much of the water is lost to vegetation. Evaporation, also, is very serious west of 90° E. The prevailing winds are north-east, dry and strong throughout the year, and reaching gale force (the Buran) in winter. The snow of winter is swept away by the wind, and the bare ground exposed to the severe winter frosts. Spring is warm, summer hot. The winds, winter frost, and the character of the rainfall combine to make the climate unfavourable to trees and favourable to grass.
4. The Temperate Desert Climate in the south (in Turkistan) has a rainfall of less than 8 inches. The summers are extremely hot, but the winters are cold for the latitude, with mean temperatures well below freezing. The air is very dry and the skies cloudless.

**The Soils of Siberia.** Russian scientists have been pioneers in the scientific study of soils, and it is only within the last two or three years that some of the far-reaching results of their studies have been appreciated by scientists familiar only with the languages of Western Europe.<sup>1</sup> It is largely owing to the influence of Russian studies that we are getting away from what may be called the geological boggy. In the majority of cases climate takes a much more important part in the manufacture of soil than does the geology of the underlying rocks. In tropical climates with alternating wet and dry seasons—let us say, for example, the tropical monsoon climate of the wetter parts of Burma—it is impossible to distinguish a laterite derived from the underlying alluvium and one formed from a gneiss or a slate. It is the climate which determines the soil. In those regions, such as the Mediterranean regions, where the hot and wet seasons do not coincide, the formation of soil is a much slower process

<sup>1</sup> K. D. Glinka's classic work, *The Great Soil Groups of the World and their Development*, was translated into English and published only in 1928 (London: Thos. Murby and Co.).

and geology plays a more conspicuous part in the character of the soils.

The soils of Siberia are determined more by climate than by the geological formations, and hence the belts of soil run across the country from west to east, following the climatic belts.

- (a) The Tundra soils are definitely the result of Arctic conditions. Rainfall is low but humidity great, owing to the low temperature, and the great feature is the accumulations of water in the surface layers overlying permanently frozen subsoil.
- (b) The Podsol soils occur in the forest belt; they are :

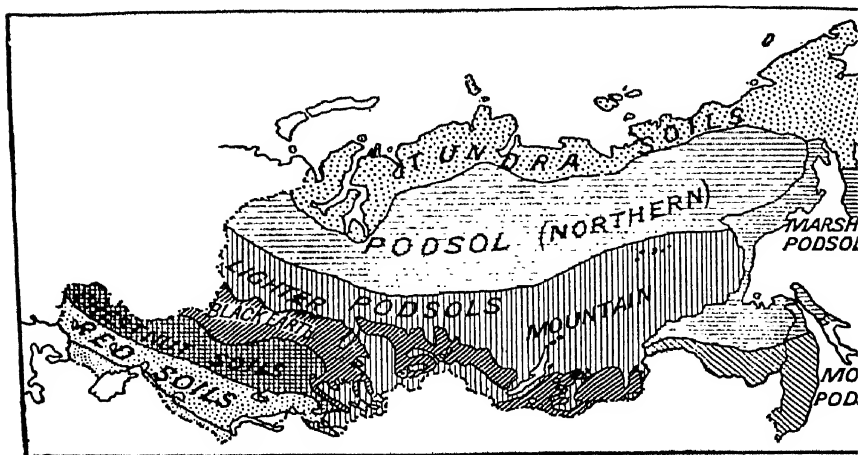


FIG. 334.—The soils of Siberia.

(After Schultz.)

For a more accurate and detailed soil-map, see *Encyclopædia Britannica*, 14th Edition, Vol. XIX,

coloured and low in fertility, and are generally so in character. In the Podsol or Podsolized soil belt vast strips of bog-soils.

- (c) The Black Earth Belt extends into Siberia from Euro Russia, and is a narrow but a very important belt, and includes the richest agricultural land in Siberia. The soil is a deep loess, rich in humus, hence the black colour. The Black Earths (Chernozems or Chernozemy) are not necessarily formed on loess, however. The essentials for their formation is high evaporation and consequent desiccation of the soil in summer and long freezing of the subsoil in winter. During winter



the water accumulates and provides for the luxuriant spring vegetation. Later the sub-soil also thaws so that there is not impeded drainage as in the tundras. The abundant humus is derived from the well-developed roots of the steppe grasses whose decay is retarded by the drought of late summer.

- (d) The Chestnut-coloured Soil Belt lies to the south of the Black Soil Belt, and is much less fertile. This is the soil of the true steppelands.
- (e) The Red Soil Belt differs characteristically from the last in its colour. Saline or slightly saline soils pass into highly saline ones with salt pans, whilst much of the soil itself is sandy. This belt is better described as the Alkaline Soil Belt because the soils are different from the typical Red Soils of the Tropics.
- (f) The Grey Soil Belt occupies a more southerly zone in the region of the Turanian depression and is characteristic of still greater aridity.

**The Vegetation Belts of Siberia.**<sup>1</sup> The vegetation of Siberia remains very largely in its original state, for man has affected but few changes except in the southern taïga and steppe-land belts. Broadly, there are but three vegetation belts—the tundra, the taïga and the steppe, the latter fading into desert in Turkistan.

*The Tundra* occupies a belt from 30 to 200 miles wide along the shores of the Arctic Ocean. The term is used loosely to cover the treeless Arctic plains north of the forest limit. The perpetually frozen lower layers of the soil prevent the filtration of surface waters to deeper levels, and when not frozen the surface layers are waterlogged. In low-lying areas moss often forms a cover several feet thick; lichens, including the famous Reindeer 'moss', are scarce in drier areas. Moss and lichens are the chief plants in the east; in the west grasses, sedges, perennial herbs, including numerous bulbs, are found. Except in sheltered nooks,

only trees are dwarf birches (*Betula nana*) and willows growing to a height of a few inches and generally creeping on the ground. Bushes of heath, azalea, and arbutus are also found. The tundra is frozen and snow-covered for eight or nine months of the year; during the few weeks of spring and summer it is teeming with birds, and swarms of mosquitoes make life unbearable. Man should not attempt to penetrate the almost impassable tundra. The waters of the rivers and the Arctic Ocean abound with salmon, cod, and sturgeon—and the sparse population derives its livelihood very largely from fishing. Reindeer may

See Schultz, *op. cit.*, and the *Handbook of Siberia and Arctic Russia* (University of Chicago Press).

also be raised: wild animals include a few Arctic species (such as the lemming, Arctic fox and polar bear) in winter, and a host of carnivores which move north after the wading birds in summer.

The *Taiga* or *Coniferous Forests* cover by far the largest area of Siberia. Nearly all the forests are full of fur-bearing animals—bear, lynx, fox, wolf, sable, squirrel, and ermine—and the scanty population is mainly engaged in hunting and fishing. Placer-mining (for gold) is important, especially in the Lena Basin. As yet the commercial exploitation of the forests has scarcely commenced.

Five types of taiga may be distinguished:

(1) The West Siberian Swamp-forest occupies the middle and

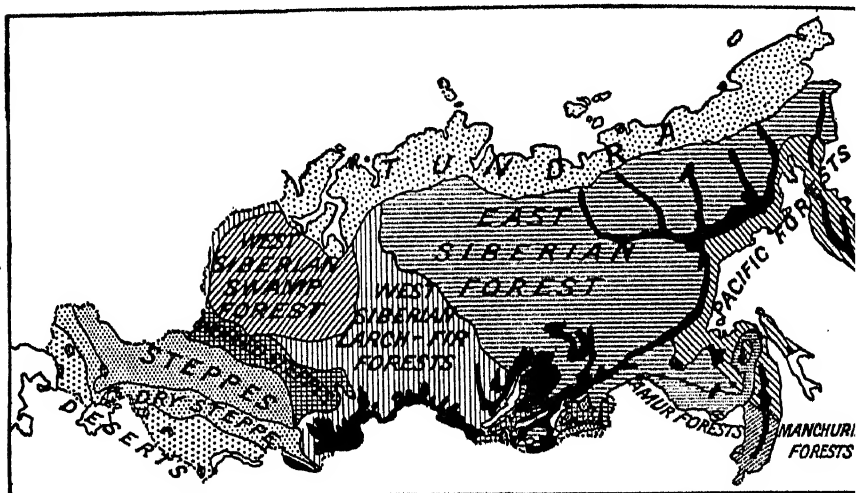


FIG. 335.—The natural vegetation of Siberia.

(After Schultz.)

lower basin of the Ob. The forest is marshy and has impenetrable undergrowth. The Siberian fir predominates; larch is rare but there is an admixture of deciduous trees (birch and aspen). Thickets of willow, alder, and poplar fringe the streams, and berry-bearing bushes (whortleberry, bilberry) are common. The south part of this area includes the well-known Vasyugan swamp.

(2) The West Siberian Larch-Fir Forest occupies the greater part of the Yenisei Basin, and the basin of the Upper Ob, stretching on to the Altai Mountains. The chief trees are the Siberian fir, the stone pine (*Pinus cembra*), the spruce (*Picea obovata*), the silver fir, and the Siberian larch. Undergrowth is frequently absent, and the forests are comparatively dry. The forests of the Altai are more open and the trees are taller. Obvious

These forests are of greater commercial value than the swamp forests.

(3) The East Siberian Forests extend from the Yenisei Basin to the Stanovoi Mountains. Growth is poorer than in the western forests, owing to the long and very severe winter and the dry cold winds. Marshy areas are rare, owing to the hillier nature of the country, and undergrowth is infrequent. Siberian fir and Eastern larch (*Larix daurica*) are the chief trees; *Pinus sibirica* and Scots pine also occur. The spruce extends as far east as the Lena.

(4) The Amur Forests are characterized by an admixture of numerous deciduous trees—oak, elm, lime, maple, walnut, ash, aspen, willow, etc.—all of Eastern species typical of China and Japan. The coniferous trees include those of the East Siberian forests as well as yew, Ayan pitch pine (*Picea ayanensis*) and the white cedar or Manchu pine (*Pinus mandshurica*); but *Pinus sibirica* is absent.

(5) The Pacific Forests occupy the Pacific slopes from Sakhalin to the south to (and including) Kamtschatka in the north. The Eastern larch, *Larix daurica*, is the prevailing species, but Siberian fir and Siberian cedar are also common. In Kamtschatka the trees are widely spaced and some natural meadows occur.

The *Wooded Steppes* lie between the true forests and the true steppes. Southwards from the forest belt firs gradually disappear, and their place is taken by birches, aspens and willows. But the trees occur mainly in clumps, or along river banks, separated by broad expanses of rolling grasslands. It is this belt which has the fertile black earth, and which forms the most valuable agricultural region in Siberia.

The *Steppes* lie to the south of the wooded steppes, in the region of the Kirghiz uplands. Feather grass (*Stipa*) is the characteristic plant; flowering herbs are numerous; trees are rare, except in a few damper spots, but dwarf thorny bushes—broom, hawthorn and tamarisk—are common. Southwards the steppes pass into the semi-desert of Turkistan. In Eastern Siberia steppes reappear in the Transbaikalian Region (south of Lake Baikal).

**Population.**<sup>1</sup> In December, 1926, a complete Census of Russia was taken for the first time. The population of the area here described as Siberia was about 15,000,000; it is difficult to state exactly because the 'Ural Territory' strides the Urals and

<sup>1</sup> An important paper on the economic geography of Siberia, which has been utilized in the following sections, is B. Bailevsky, 'Siberia—The Storehouse of the Future', *Econ. Geog.*, Vol. III, 1927, pp. 167-192.

lies partly in Europe, partly in Asia. The average density is under three persons per square mile. The population comprises three groups:

(1) The descendants of the prehistoric inhabitants, known as the Palaeo-Siberians and including the tribes of the Chukchees, Koryaks, Kamchadals (all in the extreme north-east), Gilyaks (of the Pacific Coast), Yukaghirs and Yenisei Ostyaks. With these are allied the Ainus of Japan, the Aleutians, and the Eskimos of North America (number about a million).

(2) The races who settled in Siberia during the great movements of population which took place from about the third to the thirteenth centuries, and who came mainly from Central Asia. The races are known as the Neo-Siberians and include the Voguls, Ugrian Ostyaks, Samoyedes and allied tribes, the Siberian Tartars, the Kirghiz of the Steppes, the Yakuts of the Lena Valley, the Buryats of Lake Baikal, the various Tungus tribes of the Yenisei Valley and the north-east (number in all probably about a million).

(3) The Russian immigrants, the inflow of which started in the sixteenth century, but scarcely gathered force until the opening years of the present century.

*The Aborigines.* Space prevents us from considering the aboriginal tribes, interesting as they are; but an interesting account of them is readily available in the Admiralty *Handbook of Siberia and Arctic Russia*. The Chukchees, Koryaks,<sup>1</sup> Kamchadals and Samoyedes are hunters, fishers, and reindeer breeders; the Tungus tribes are occupied chiefly in hunting. The Buryats raise live-stock and engage in a little agriculture; the Yakuts breed live-stock, and of course the Tartars and the Kirghiz of the steppes are stock-rearers.

*The Russian Colonists.* The bulk of the colonists are found in the agricultural belt of Western Siberia, where before the War density was estimated to range as high as 20 or 25. The Russian colonization of Siberia dates from the sixteenth century, the first settlers arriving in 1593 after the conquests of Yermak in the reign of Ivan the Terrible. The first colonists were traders who were attracted by the fur trade, and Cossacks who formed a sort of military guard for the traders. The use of Siberia as a place of exile for criminals, political or religious, dates from about 1648. Between 1823 and 1898 700,000 exiles with 216,000 voluntary followers passed into Siberia. A distinction should be made between criminal exiles (187,000 of the above total plus 107,000 companions) who are condemned

<sup>1</sup> The plural form is more correctly Koriaki, Kamchadaly, Tungusy Buriaty, etc..

o hard labour, and who have been co  
ast, and the political exiles who for  
nd valuable settlers. Religious exiles  
askolniki—are especially predominant  
o numerous that it is said that before  
stituted 10 per cent. of the entire population of Russia.

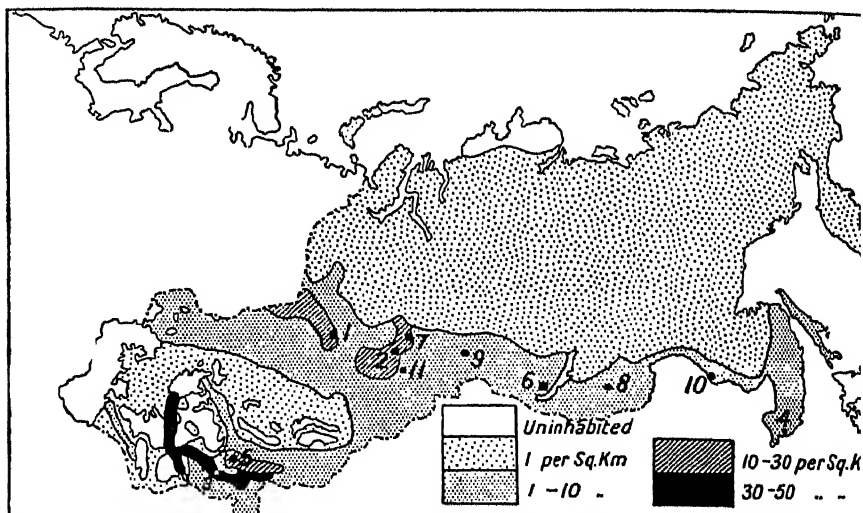
The colonization of Siberia by free settlers progressed very  
owly until about 1896. The abolition of serfdom in 1861  
nabled the Russian peasant to leave his native soil; the nominal  
bolition of criminal exile to Siberia in 1900, the building of the  
rans-Siberian Railway in 1902 and the directing of attention  
o Siberia by the Russo-Japanese War in 1904-5, and the active  
overnment support of the colonists, were all factors encouraging  
ettlement. The following figures show the progress of coloni-  
ation by free settlers :

1870-1890	.	.	.	.	.	500,000
1896-1905	.	.	.	.	.	1,078,000
1906	.	.	.	.	.	141,294
1907	.	.	.	.	.	427,339
1908	.	.	.	.	.	664,777
1909	.	.	.	.	.	619,320
1910	.	.	.	.	.	316,163
1911	.	.	.	.	.	189,791
1912	.	.	.	.	.	201,027
1913	.	.	.	.	.	234,877

In the latter part of this period the percentage of returning  
olonists had fallen to about 4 per cent. a year. The immigrants  
ere nearly all Russian peasant farmers and settled in the Black  
oil Zone, along the railways, and in certain of the river valleys.  
According to the Census of 1926, about 85 per cent. of the popu-  
ation is rural, living in villages of log-huts arranged on both sides  
f a single street. Urban communities have only recently been  
arkedly on the increase, and only in the ten years before the  
ar did the towns of Siberia commence to carry out modern  
chemes of water supply, sewerage and lighting. In 1926 only  
ree towns—Omsk (161,600), Novo-Sibirsk (120,700), and Vladi-  
ostok (107,980)—had a population over 100,000; six others  
ad a population between 50,000 and 100,000. These are  
kutsk, Tomsk, Tschita, Krasnoyarsk, Blagovyeshchensk, and  
arnaul. All these, it will be noted, are on, or closely linked  
ith, the Trans-Siberian Railway. Tobolsk, advantageously  
tuated at the junction of the Tobol with the Irtish, with its  
3,500 inhabitants, is the only town of any size away from the  
ilway. Places like Verkhoyansk in the far north are merely  
llages of wooden huts. Estimates of population 1933 shows  
me remarkable increases—Omsk to 227,000; Novo-Sibirsk to

278,000; Vladivostok to 190,000; Irkutsk to 158,500; Toms to 128,000; Krasnoyarsk to 101,500, and Barnaul to 109,000.

**Agriculture.** Fig. 337 shows the marked concentration of agriculture in the Black Earth Region, and its absence alike in the cold and forested north, and in the arid south-west. Topography, as well as soil and climate, is an important factor in limiting agriculture to the Forest-Steppe belt of Western Siberia; here are vast plains of low altitude, whereas in Eastern Siberia there are few plains, and only narrow valleys.<sup>1</sup> I



Towns:—1. Omsk (161,600); 2. Novo-Nikolaevsk (Novo-Sibirsk) (120,700); 3. Samargand (105,200); 4. Vladivostok (107,980); 5. Tashkent (323,600); 6. Irkutsk (98,960); 7. Toms (92,400); 8. Tschita (61,500); 9. Krasnoyarsk (72,400); 10. Blagovyeschensk (61,200); 11. Barnaul (74,300).

FIG. 336.—Siberia—density of population and chief towns, according to the Census of 1926.

(After B. Semenov-Tian-Shansky, *Geographical Review*, Vol. XVIII, 1928.)

general the conditions are closely comparable with those in the prairies of North America—in Minnesota and the Dakotas, and in the southern parts of the Prairie Provinces of Canada. The Census taken in 1917 just prior to the Revolution showed that there were nearly 2,000,000 farmsteads, 81 per cent. belonging to peasants, 15 per cent. to natives and 4 per cent. to Cossacks. The acreage under crops was 27,400,000. In addition about 18,000,000 acres previously tilled and used for hay remained uncultivated, and 9,000,000 acres was fallow land in accordance with the general system of rotation.

<sup>1</sup> See S. Novakovsky, 'Climatic Provinces of the Russian Far East in relation to Human Activities', *Geog. Review*, Vol. XII, 1922, pp. 100-111.

In the five-year period 1911-15 about 21,000,000 acres were cultivated as follows:

	Per cent. of Area.
Grains . . . . .	94
Spring Wheat . . . . .	48
Oats . . . . .	28
Rye . . . . .	14
Barley . . . . .	4
Potatoes . . . . .	2
Flax . . . . .	1
Hemp . . . . .	1
Miscellaneous . . . . .	2

Comparative figures are not available for recent years owing to the changes in political boundaries.

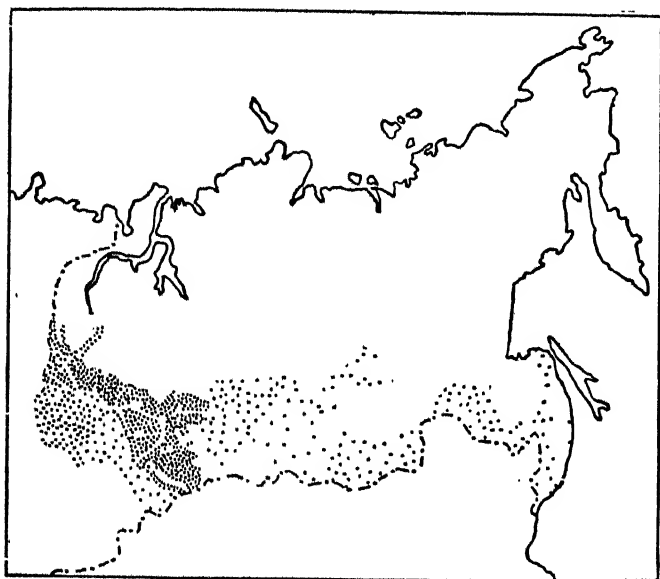


FIG. 337.—The distribution of agricultural land in Siberia.

Each dot represents 27,000 acres.

According to the 'Spring Sowing Plan' of 1935, however, about 30,000,000 acres were to be sown in the area called Siberia in this book—that is, in the areas described officially as the Omsk Region, West Siberia, Krasnoyarsk Region, East Siberia, Far Eastern Region and Yakutsk Republic. Although the total Russian area under wheat shows little change, its cultivation in these areas is being expanded in order to produce a surplus for export to the Russian Central Asian republics, where more land





can thus be released for the growth of cotton and other sub-tropical crops.

In Russia as a whole approximately 88 per cent. in 1935 of the cultivated land was in State and Collective Farms. Of the 30,000,000 acres mentioned above in Siberia approximately 5½ million acres were in State Farms, 21½ in Collective Farms, leaving only 3 million or 10 per cent. cultivated by private farmers.

The crops vary according to the varieties of soil. Wheat grows best on the sandy black soil; barley and spring rye on the brownish rather infertile soil of Central Tomsk; oats are most abundant along the great Siberian road. The yields in Siberia are considerably lower than on similar land in Canada or the United States, and wide fluctuations from year to year are due to cold blasts from the north, or hot winds from the arid lands to the south.

It is usual to sow the land for two or three years, then to leave it fallow for a year; then to sow again for one or two years. This process is repeated until the land shows signs that it needs a rest. Intensive agriculture is practised on irrigated lands around Lake Zaisan in Semipalatinsk.

Dr. Baievsky, in the paper quoted above, estimates that in Siberia there is an additional 200,000,000 acres suitable for crop raising; sufficient to accommodate 4,000,000 families, or 20,000,000 people. Thus the acreage under wheat might reach 150,000,000 acres (compare Canada, 25,000,000 acres in 1930; United States, 59,000,000 acres in 1927), and the acreage under oats 75,000,000 acres (compare Canada, 13,250,000 acres in 1930). At the present yield a surplus of 1,000,000,000 bushels would be available for export, or with improved yield double that quantity. This may be compared with a total quantity of 750,000,000 bushels which entered into world trade in 1931-35 (average), or the export surplus of 200,000,000 bushels from Canada (1931-34). Similar stupendous figures are obtained if oats are considered. Leaving aside the difficulties of the present political administration in Siberia, the main problem in development is the cost of transportation.

A very interesting and important calculation was made a few years ago by the late Dr. C. F. Marbut, then head of the United States Soil Survey, as to the possibilities of expansion of the wheat area in Russia.<sup>1</sup> Basing his calculations on the area covered by chernozem and chestnut soils, he came to the conclusion that the possible wheat area on the steppelands of European

<sup>1</sup> Russia and the United States in the World's Wheat Market, *Geog. Review*, Vol. XXI, 1931, pp. 1-21.

and Asiatic Russia was 854,500,000 acres compared with only 234,500,000 acres in the United States. Thus Russia alone *could* produce, at a very moderate yield of half a ton or 18 bushels per acre, nearly four times the present total world production of wheat. Several authors,<sup>1</sup> however, regard Dr. Marbut's calculations as unduly optimistic and hold that he paid insufficient attention to unfavourable climatic conditions and the presence of harmful alkali in some of the soils.

Among the minor crops of Siberia may be noted buckwheat, millet, peas, beans, sugar-beet (rapidly increasing), sunflowers and tobacco.

Live-stock is especially important in the Khirghiz steppelands, the southern portion of Siberia proper and Transbaikal. The Census of 1917 showed the following:

Cattle	.	.	.	.	.	.	11,400,000
Sheep	.	.	.	.	.	.	14,700,000
Pigs	.	.	.	.	.	.	3,400,000
Goats	.	.	.	.	.	.	1,000,000
Horses	.	.	.	.	.	.	7,800,000

The rapid rise to importance of co-operative dairying is in large measure due to the fact that the produce is relatively more valuable, and can stand higher transport charges. Although dairying was only introduced in 1893, in 1909-13 Russia as a whole ranked second to Denmark in the quantity of butter exported, the quantity from Siberia reaching 165,000,000 lb. in 1912. The success of the industry is due in large measure to the quality of the milk, only 20 lb. of milk being required to produce 1 lb. of butter compared with 28 lb. for the same period in Denmark. The excellent pastures are responsible for this. The industry is concentrated west of Krasnoyarsk; in summer many refrigerator trains weekly run from Novo-Sibirsk.

**Forests.** The forest area of Siberia is estimated to be 1,083,500,000 acres—two and a half times that of European Russia. Forests cover 22 per cent. of the surface of Western Siberia, 39 per cent. of the surface of Eastern Siberia. The variation in the character of the forests has already been noted, and very large areas must be classed as unmerchantable, not only because of inaccessibility, but because the swampy nature of the ground must of necessity result in indifferent if not useless timber. The table given on the next page shows the quantity of timber available annually (possible annual cut) consistent with conserving the supplies and the quantity actually cut <sup>2</sup>:

<sup>1</sup> See V. P. Timoshenko, *Geog. Review*, Vol. XXIII, 1933, pp. 479-481.

<sup>2</sup> Based on tables given by Zon and Sparhawk, *Forest Resources of the World*.

Timber.	Millions of Cubic Feet. Possible Annual Cut.
Pine . . . . .	1,832
Cembra pine and larch . . . . .	2,276
Spruce and fir . . . . .	2,689
Oak, ash and elm . . . . .	344
Birch, aspen and poplar . . . . .	3,645
Total . . . . .	10,786

The actual cut in 1913 was 244,263,000 cubic feet—only .3 per cent. of that actually possible. The oak, ash, and elm are almost entirely from the Amur and the Pacific Forests. The entire timber production in 1913 was only valued at about 400,000. The exploitation of Siberia's forests was seriously undertaken as part of the First Five Year Plan (1928–32). According to Mikhaylov, production during that period was increased by 70 per cent. in the Urals, 110 per cent. in Eastern Siberia and 210 per cent. in Western Siberia. In 1928–29 out of a total production in the U.S.S.R. of 55,000,000 cubic metres (approximately 1,925,000,000 cubic feet), 7.6 per cent. came from Siberia, and 3.1 per cent. from the Far Eastern Region, with the addition of 10 per cent. from the Urals. According to the Second Five Year Plan, the total out-turn for 1937 is to be 6,000,000,000 cubic feet and it is planned that the Urals shall produce 14.8, West Siberia 6.2, East Siberia 6.5 and the Far Eastern Region 7.1 per cent. of this. This would give about 1,500,000,000 cubic feet for the area under consideration. Wood-working industries are developing in Siberia itself, especially at Krasnoyarsk. Much timber, despite the short open season, is floated down the Yenisei to the Arctic Ocean. There some of it is worked, but the bulk taken by the 'caravan' of timber-carrying ships accompanied by ice-breakers and aeroplanes through the Kara Sea to Europe.

With the forest wealth of Siberia may be associated the fur trade. In some areas of the taiga and tundra trapping is the chief means of livelihood of the people and, as in all parts of the world, the numbers of animals are rapidly diminishing. Sables are now rare; squirrels, most important of all, are rapidly becoming scarcer. Other important fur-bearing animals include fox, hare, ermine, marten and bear. The value of the fur trade is difficult to assess, as most of the furs pass through European Russia or through the countries of Asia. It was claimed in 1935 that Soviet Russia supplied 30 per cent. of all furs entering international trade.

**Fisheries.** Siberian rivers and lakes abound in fish, but the most important fisheries are those along the Pacific Coast, especially round Kamschatka. The annual catch between 1909

and 1922 has been between 110,000 and 130,000 tons, with marked tendency to increase. Ninety per cent. of the catch is salmon, and the salmon fisheries and canneries are in Japanese hands. In 1921-23 the pack averaged 700,000 cases of 48 one pound tins.

**Minerals.** The mineral wealth of Siberia is second only to its agricultural resources. The distribution of minerals reflects closely the structural geology, and there are three main mineral-bearing regions :

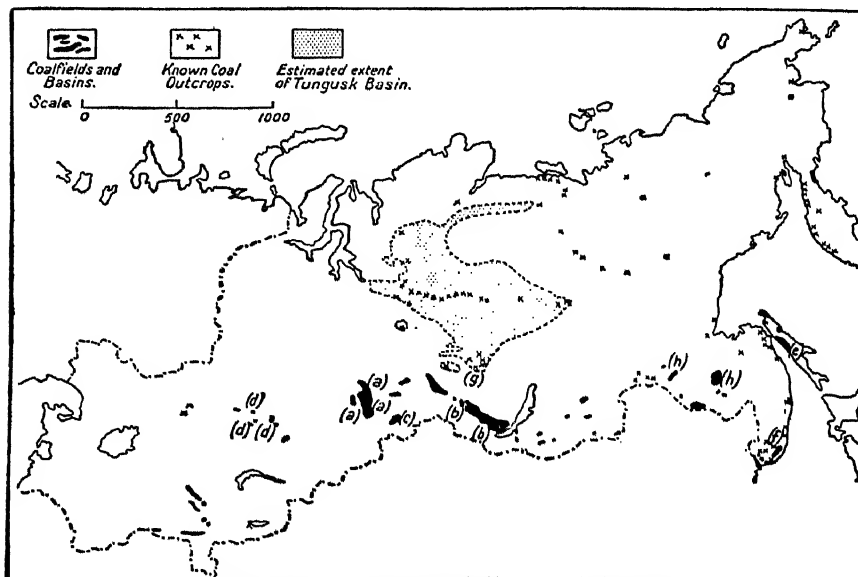


FIG. 339.—The coal resources of Siberia.

- (1) The Altai Mountains—Kirghiz Upland Region of Western Siberia, with copper, gold, zinc, silver, etc.
- (2) The Old Shield of Asia—a very important region including the regions round Lake Baikal, with coal, iron, gold, etc.
- (3) The Eastern Mountain region, especially in the upper basin of the Amur, which because of its accessibility is the most important region.

Coal<sup>1</sup> resources have been estimated at 400,000,000,000 tons.

<sup>1</sup> P. P. Goudkoff, 'Economic Geography of the Coal Resources of Asiatic Russia', *Geog. Review*, Vol. XIII, 1923, pp. 283-293. I. Mikhaylov in his 'Soviet Geography' (Methuen, 1935), adds

netric tons, equal to a quarter of the total resources of Asia, or a half of those of Europe. The chief basins are:

- (a) Kuznetzk Basin.
- (b) Irkutsk Basin.
- (c) Minusinsk Basin.
- (d) Kirghiz Steppe Basins (Karaganda Basin in Kazak Republic).
- (e) Sakhalin Island.
- (f) Maritime Provinces.
- (g) Tungusk Basin.
- (h) Bureinsk Basin.

In 1934 the Kuznetzk Basin produced 11,600,000 tons; the

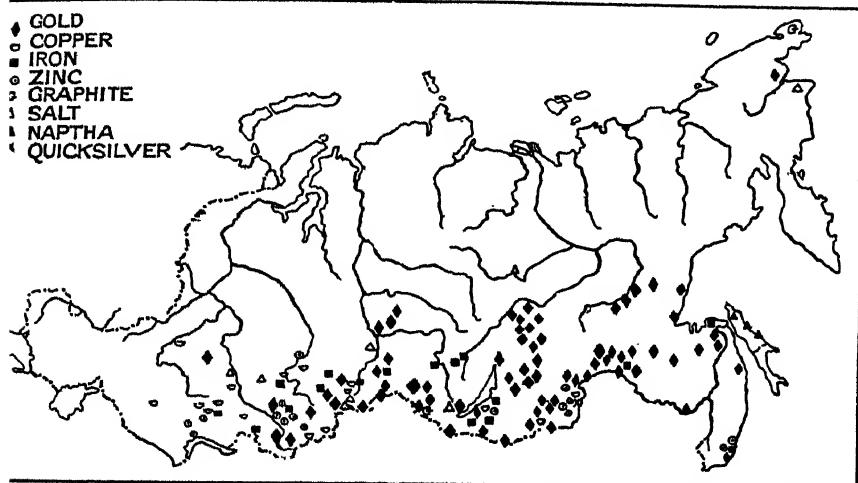


FIG. 340.—The mineral deposits of Siberia (excluding coal).  
(After Schultz.)

irkutsk Basin, stretching for 300 miles along the Trans-Siberian Railway, 3,500,000 tons; and the easily accessible basin of the Maritime Provinces near Vladivostok, 3,000,000 tons.

*Petroleum* occurs in the Russian portion of Sakhalin, and its exploitation has been a matter for negotiation between the Japanese and Russians. Kamschatka may also have important fields, but the remainder of Siberia is not particularly promising. The Caucasus belt, however, extends eastwards into Turkistan, and there are oil-fields or indications the whole length of the Urals.

These the Yakutia area near the Lena river (shown by scattered crosses in fig. 339) and estimates the total reserves in Asiatic Russia at nearly 180,000,000,000 tons, allowing 400 billion tons in the Kuznetzk Basin and 400 billion in the Tungusk.

*Gold* is very widely distributed in Siberia; the principal gold-mining districts up to the present have been in the Olekma-Vitim region of the Lena Basin. The production from 1910-1914 averaged 1,500,000 ounces troy from all the Siberian fields and the industry employed 57,000 people. The deposits worked are all placer deposits. The Lena Goldfields were for long exploited by a company mainly with British Capital. In 1935, after long negotiations, terms were agreed for the compensation of the company. Russia now claims to be the world's second producer of gold.

*Copper* is especially important in the Kirghiz Steppes, in the Altai Region, and in the southern part of the Yenisei Province.

*Zinc, Lead and Silver* are most important in the Altai Region in Transbaikalia, and the south-eastern coasts of the Maritime Territory.

*Iron Ores* are widely distributed, and are now being worked. Specially important deposits include those of Telbes in the Kuznetsk coal basin, Minusinsk in Yenisei, Olga district in the Maritime territory and in the Irkutsk Province.

*Other minerals* include tin, manganese, rare metals, such as platinum, iridium, and osmium, and numerous non-metallic minerals.

**Industrial Development.** The Russian immigrants in Siberia took with them their *Koulsar* (peasant) industries and they found in their new homes an even greater need for these occupations in the long severe winter. Woodwork, the dressing of sheepskins and furs, the spinning and weaving of wool, metal-working and rope-making are all widespread. More localized are the beer industry of the Irkutsk district, the making of metal containers for milk and of skin coats in the Barnaul district, the pottery industry of Yeniseisk and the specialized metal and woodwork of Kuznetsk and Tomsk. But in recent years factory industries have been increasing with the growth of urbanization. Not only is there the need for preparing local commodities for distant markets—hence the numerous creameries and butter factories—but distances are so vast in Russia that local factories for local needs are concerned with brewing, distilling, weaving, glass making, brick and cement making. The localization of boot building at Minusinsk and carriage-building at Omsk and Tomsk is also to be expected.

Not only have the First (1928-32) and Second (1933-37) Five-Year Plans aimed at the industrialization of Russia but they have aimed also at a better distribution of industries. Here the amazingly rapid growth of the new industrial areas shown in Fig. 341. The chief areas are:—

(a) The Southern Urals, with two main centres around

Magnitogorsk and Orsk, devoted to iron, steel and heavy industries.

- (b) The Krasnoyarsk Region, on the coalfield, and devoted especially to the heavy industries and chemicals but with

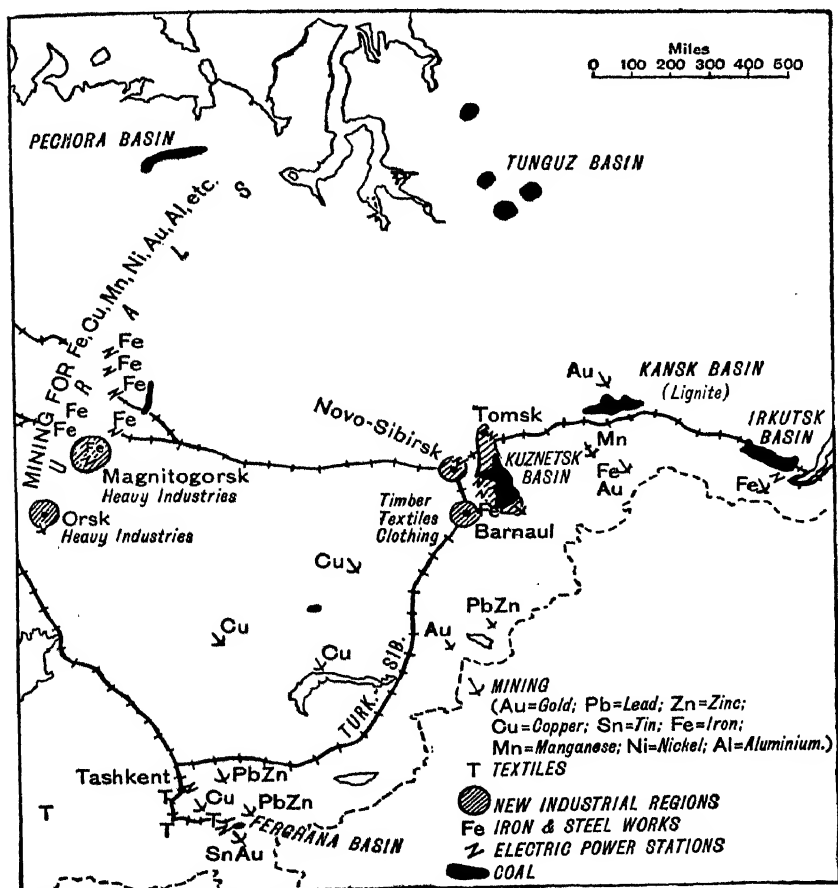


FIG. 341.—The coalfields and new industrial regions of Western Siberia.

a northward extension to Tomsk concerned especially with wood-working industries.

- (c) The Novo-Sibirsk area, mills, etc.  
 (d) The Barnaul area, textiles and clothing.

To these may be added the textile industries developing in Turkistan, in the home of cotton. The great use made of electric power, both hydro-electric and carbo-electric, is noteworthy.

**Communications.** It will have been gathered already that no factor plays, indeed no factor will play in the future, so important a part as communications. In a country which is 5,000 miles from end to end low-cost transportation is a primary problem. To the north are the Arctic wastes, to the south are the sparsely inhabited regions of Central Asia which offer no outlet to Siberia's products. With the exception of the Amur, the rivers of Siberia flow from south to north: consequently the railways and the highways must provide the outlet to east and west.

Siberia's trade with the outside world practically started only with the construction of the first railway—the great Trans-Siberian. This is the longest single railway line in the world from Leningrad to Vladivostok is over 5,400 miles, and the cost to the Russian Government was over £200,000,000. It was built in six sections simultaneously. The main line runs from Omsk, Novo-Sibirsk, Krasnoyarsk, Irkutsk, Tschita (Chita) and Khabarovsk to Vladivostok. At first the trains were ferried across Lake Baikal, or across the ice in winter, but later the line was built round the southern shore of the lake. From Chita to Vladivostok the North Manchuria Railway, formerly the Chinese Eastern Railway,<sup>1</sup> affords a shorter route, but through Manchuria via Harbin. The most important branches are Targa-Tomsk, Petropavlosk-Kokchetav and Verkhne-Udinsk-Kiakhta. The latter is to be extended to Urga, the capital of Mongolia. Other important lines include the Altai Railway from Novo-Sibirsk to Semipalatinsk through fertile agricultural land; the Kuznetsov coalfield line from Yurga, and others. The line from Semipalatinsk was linked with the Turkistan railways in 1930—the Turk-Siberian Railway thus formed making possible an interchange of foodstuffs from Siberia with semi-tropical products.

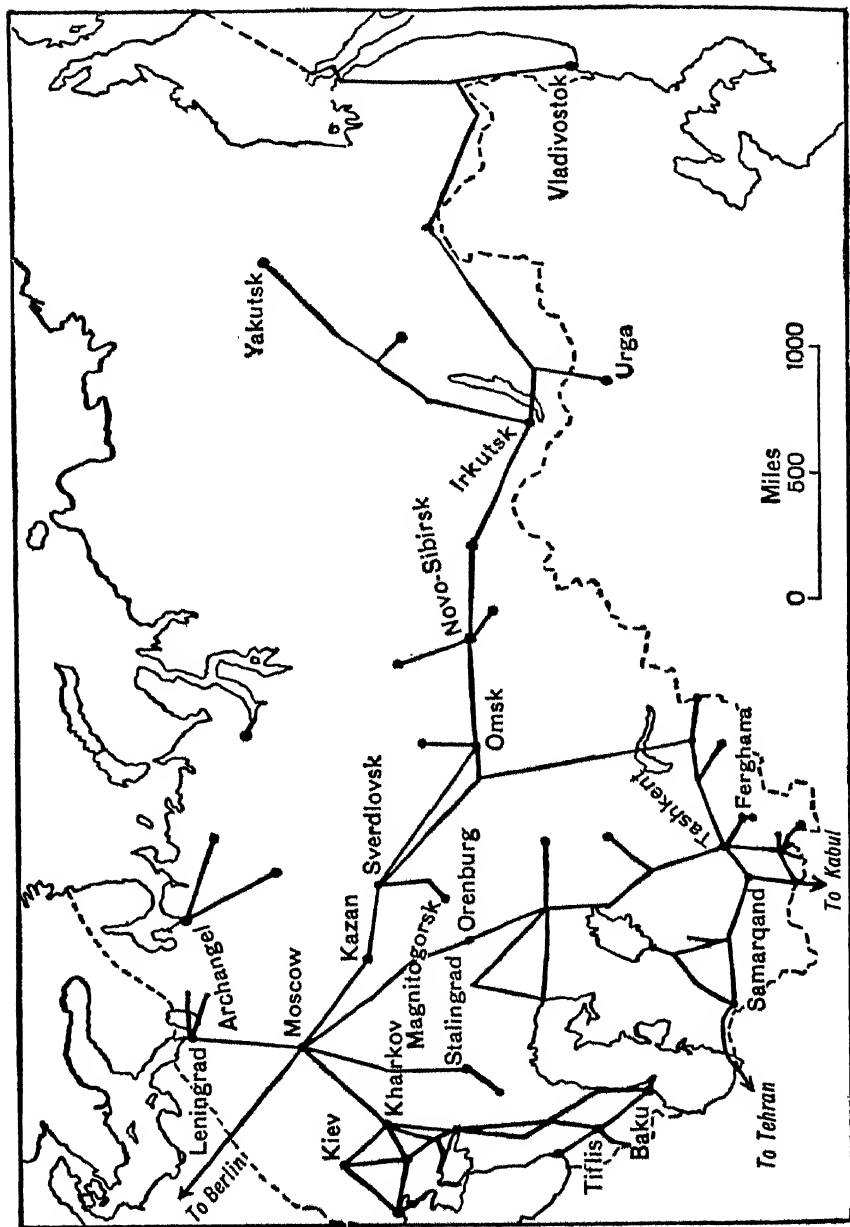
Siberia has only about 2,500 miles of 'improved' roads, but owing to the flatness of the country and the low rainfall the unimproved 'wagon roads' are open for wheeled traffic, including now motor-cars, for most of the year. There are 90,000 miles of such roads. One of the most famous of Siberian roads is the Great Siberian Military Road or *Trakt* from Moscow to Vladivostok—the track followed by so many thousands of hapless exiles.

About 6,000 miles of Siberia's rivers are said to be navigable in the open-water season. The east-west tributaries are often more important than the main north-south streams. Before the War a commission investigated and favourably reported on a scheme to link the waterways and allow uninterrupted navigation.

<sup>1</sup> Sold by Russia to Manchukuo and Japanese interests in 1935







tion from the Pacific to the Urals, and thence by linking the Ob with the Volga to Europe. The North Coast Sea route is possible and, indeed, is quite commonly used, but is only open for one or at the most two months of the year. Consequently the chief ports are Vladivostok and Nikolayevsk on the Amur. Great progress has been made recently with aerial transport—as suggested by Fig. 343—the aeroplanes landing on skis in winter.

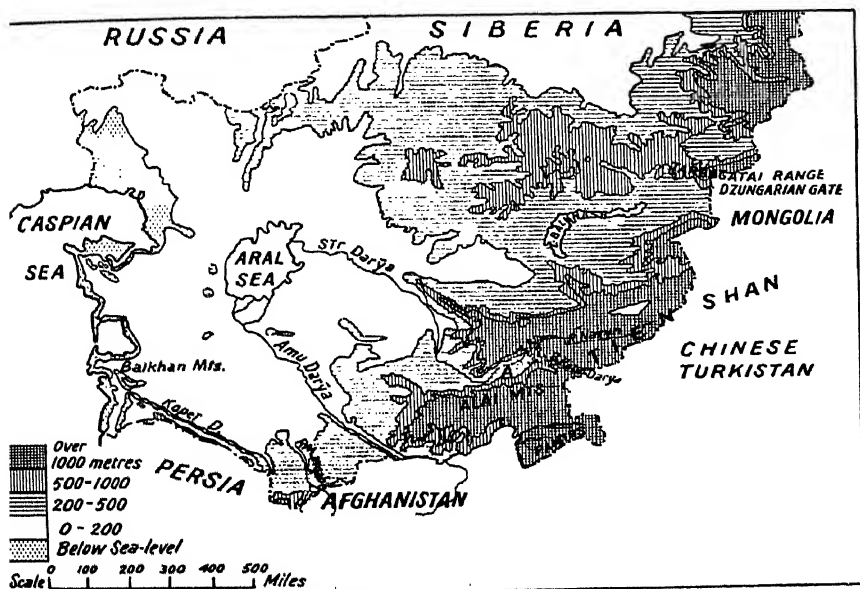


FIG. 344.—Physical map of Russian Turkistan.

A = Plain of Ferghana.

### RUSSIAN CENTRAL ASIA

Russian Central Asia lies between the Caspian Sea on the west, the great Pamir-Tien Shan mountain divide on the east, Siberia on the north and Persia and Afghanistan on the south. The whole area has conventionally been called Russian Turkistan, a name which indicates one salient feature—that it is inhabited mainly by Turkish races. The Russian expansion into Turkistan in the eighteenth and nineteenth centuries has already been mentioned (see Fig. 71)—but the greater part did not come under Russian dominion until about seventy years ago. In 1866 Tashkent was occupied, and in 1868 Samarkand. In 1873, the

Emir of Bukhara recognized the suzerainty of Russia. Under 1917 Russian Central Asia was divided politically into:

- (a) The Transcaspian Province of Russia proper—the desert country east of the Caspian Sea.
- (b) The Khanate of Khiva, south of the Aral Sea, along the left bank of the Amu Darya or Oxus.
- (c) The Emirate of Bukhara or Bokhara—roughly the upper basin of the Amu Darya.
- (d) The Governor-Generalship of Turkistan, which included the fertile lands of Samarkand and Ferghana.



FIG. 345.—The old political divisions of Russian Central Asia.

- (e) The Provinces of Semiretchensk and Semipalatinsk, the latter bordering Siberia but whose southern part drains to Lake Balkash.
- (f) The Provinces of Akmolinsk, Yurgai and Uralsk—the drier Kirghiz Steppes south of the more fertile Black Earth steppes of Siberia.

The divisions (a), (b), (c) and (d) together were broadly equivalent to the old land of Turan and constitute the area commonly known to geographers as the Turanian Basin.

Professor d'Almeida, whose excellent description should be consulted,<sup>1</sup> considers the area geographically under four headings (a) The Kirghiz Steppes; (b) the Mountainous Border; (c) the

<sup>1</sup> *Geographie Universelle*, Tome V, 1932, pp. 267-319.

ultivated Lands ; (d) the Aralo-Caspian Deserts and Turkmen. Perhaps a simpler geographical division is into—

- (A) The Kirghiz Steppes.
- (B) Russian Turkistan proper—the Turanian Basin and its orders.

### A) The Kirghiz Steppes.

South of the Black Earth Belt is a wide tract of much drier and less fertile steppeland. This tract connects the southern end of the Urals on the one hand with the branches of the Altai



FIG. 346.—The present political divisions of Russian Central Asia.

and Tien Shan on the other, and occasional outcrops of granite, basic igneous rocks and older sedimentary strata indicate a structural connection. In many other ways this is a zone of transition, a passage-way. It connects the steppes of southern European Russia with the steppes of Mongolia (through the Hungarian Gate). With a rolling topography, few water-courses and an absence of trees it was a naturally cleared route-way along which journeyed the hordes of Mongols under Gengis Khan in the Middle Ages. Over the whole area January average temperatures range from about zero Fahrenheit in the north to 14° or 16° F. in the south; July averages from 72° F. in the north to 81° F. in the south. The nomadic steppe dwellers are the Kazaks or Kirghiz, and the essential unity of the region and of its

people was recognized by the creation in 1920 of the Kazak Socialist Soviet Republic within the U.S.S.R. As subsequently enlarged this Republic has an area of over 1,100,000 square miles and a population of 6,500,000 (1926), of whom 6,000,000 are described as 'rural'. Within the Kazak Republic, two Autonomous Regions were established, in the interests of distinct groups of Kirghiz tribesmen—that of Kara-Kalpakia extending south-east of the Sea of Aral, and Kirghizia covering most of old Semiretchensk Province. Kara-Kalpakia became a separate Socialist Soviet Republic in 1933 (48,500 square miles; 305,000 population in 1926); Kirghizia in 1927 (76,000 square miles; 993,000 in 1926).

### (B) Russian Turkistan proper.

Russian Turkistan, excluding the northern portion now lying within the Kazak Republic, 'is a country of almost desert plain for three-quarters of its area, and a country of mountains, in part very lofty, for the remainder. These mountains, with their snows and their glaciers, are a source of life for the valleys and plains; for they furnish water for artificial irrigation, and allow the creation of flourishing oases in the midst of the desert. The translation from desert to oasis is generally abrupt, once seen it is never forgotten.'<sup>1</sup> Irrigation has been practised since remote antiquity; in a country in which rain is very scarce in the summer season, it is practically indispensable. Crops can be cultivated without irrigation in the mountain valleys, but not on the plains where pulses, fruit, rice and fodder all depend on artificial watering.

Russian Turkistan includes the following geomorphological units:

(1) The Plateau of Ust Urt, about 500 or 600 feet above sea-level, formed of horizontal Tertiary rocks, lies between the Caspian and Aral Seas, from which it is separated by sharp escarpments. In spring, after the melting of winter snows and the spring rains, there is a sparse covering of vegetation which rapidly disappears.

(2) The Desert of Kara-Kum (black sand) lies to the south and south-east of the Ust-Urt Plateau, and stretches almost to the Persian and Afghan frontiers and from the Caspian on the west to the Amu Darya on the east. It is an irregular plain.

<sup>1</sup> A. Woeikof, *Le Turkestan Russe* (Paris: Colin, 1914). This excellent book should be consulted for all aspects of the geography of Russian Turkistan. See also A. Schultz, *Die natürlichen Landschaften von Russisch-Turkestan* (Hamburg: Friederichsen, 1920), comparing review in *Geographical Review*, Vol. XII, 1922, p. 151.

covered with shifting sands which form into horseshoe-shaped lunes 15-40 feet high, which tend to become gradually fixed by the growth of vegetation, forming a very poor type of steppe, unless destroyed by grazing animals. There are also clayey depressions (takys) with salt efflorescences and almost without vegetation.

(3) The southern borderland stretches along the frontiers of Persia and Afghanistan. Where the surface commences to rise from the Kara-Kum desert to the mountains of Kopet-Dagh, there are fertile loess soils; a little herbaceous vegetation appears and where streams descend from the mountains oases

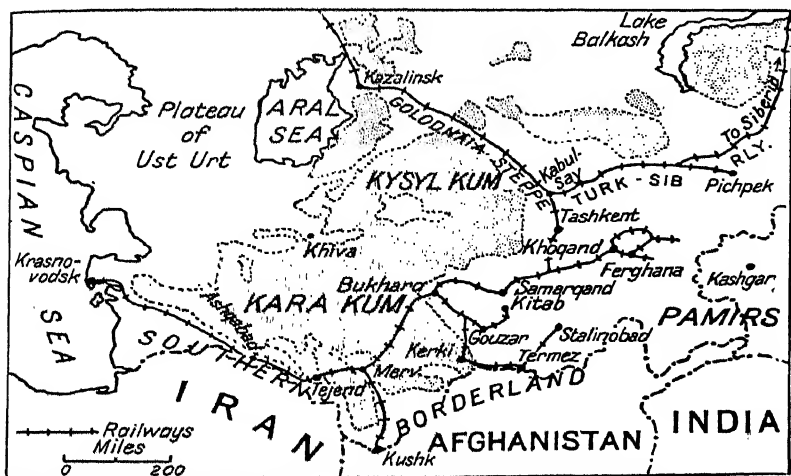


FIG. 347.—Russian Turkistan, showing the extent of desert areas (dotted) and the railways.

(After Woeikof; the *Atlas of Russian Agriculture* gives a very much more optimistic map of this area.)

have been established. But the quantity of water is small; along 300 miles of the Transcaspian Railway there are only twenty-seven springs of any size, and all water is absorbed in the irrigation of fields and gardens. In the neighbourhood of Tejed and the river Murgab (around Merv) the grassy steppes are more extensive, and larger areas are irrigated.

(4) The Desert of Kysyl Kum ('red sand') stretches between the Amu Darya and the Sir Darya, south-east of the Sea of Aral. It is more varied than the Kara-Kum; there are small ranges of mountains and stretches of grassy steppe. Special attention has been directed of recent years to the 'Golodnaia steppe' along the Sir Darya and the Tashkent Railway. It is

a stretch of level land with a clayey or loamy soil, in spring covered with vegetation, which can easily be irrigated from the Sir Darya, and is regarded as having an important future.

(5) The Plain of Ferghana is a small oval-shaped plain, with its long axis from east to west, almost completely surrounded by mountains. The snows of the mountains furnish abundant water, and this is one of the most flourishing regions of Turkistan and the centre of cotton cultivation. It is watered by the K. Darya flowing from the east, and the Naryn from the north-east; the two streams uniting to form the Sir Darya. The route

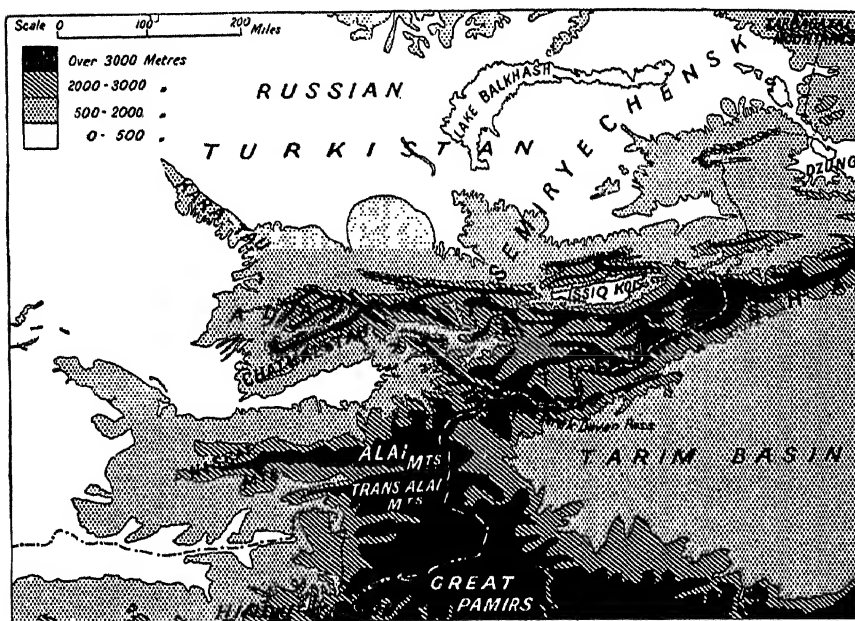


FIG. 348.—The mountain border of Russian Turkistan.

across the Terek Davan Pass is the chief route from Russia to Chinese Turkistan, from Samarqand and the plain of Ferghana to Kashgar.

(6) The Mountain Border occupies most of the remainder of Russian Turkistan. The Tien Shan and its westward continuation lie between Turkistan proper and Semiretchensk. Among the mountains of the Pamir-Alai Group is the well-known valley of the Alai, famous for its fine pastures. In the south-west of Turkistan special mention should be made of the Balk Mountains as being the Transcaspiian continuation of the more loftier Caucasus.



To sum up, deserts or very dry steppes and mountains occupy most of Turkistan ; the fertile areas wherein most of the population is found cover less than 15 per cent. of the surface ; the extension of cultivated land is a question of utilizing to the full the river water of the country, notably that of the two great rivers—the Amu Darya (or Oxus of the Ancients) and the Sir Darya. The most fertile soil is the loess, comparable in origin with the loess of China, which occupies especially the strips at the foot of the mountain ranges.

Russian Turkistan has long been famed for a supposed richness in minerals. Placer gold occurs and some copper deposits ; salt is abundant as a precipitation from the salt lakes ; indifferent coal occurs, and there are indications of oil near the eastern shores of the Caspian and in Ferghana, but in the latter locality the disturbed condition of the rocks is against the presence of large oil-pools.

The climate of Turkistan has already been mentioned in outline. The January temperature is usually below freezing ; the July usually over 80° F. Skies are most clouded—but only about half—in January, and clearest in August. Northerly, north-easterly and north-westerly winds predominate, except among the mountain valleys where local winds mask the general circulation. The winds in the Ferghana 'gate' are particularly interesting. In winter calm days are fine, but cold ; on breezy days the wind is an easterly wind of Föhn type, and is accompanied by a marked rise in temperature. In summer on the plains, strong but dry west winds are dominant which scorch any vegetation left from spring. On the plains the rainfall ranges from about 3 or 4 inches to about 6 inches, increasing in the east among the hills to 14 inches at Samarqand and Tashkent and more at greater heights. Nearly all localities show a marked spring maximum.

Five belts of natural vegetation may be distinguished : the desert belt, the steppe belt, the loess foothill belt, the mountain sparse-forest belt, and the Alpine zone. The vegetation of Turkistan has been well studied ; attention has been drawn to the fact that nine-tenths of the trees grow on sandy soil where their roots can penetrate easily to great depths to touch deep-seated supplies of water. It has been indicated that this circumstance should be taken advantage of, and the cultivation of vines and deep-rooted fruit-trees extended.

Amongst crops cultivated wheat occupies a leading position ; followed in acreage by cotton, then by barley, rice, millets, and maize. Special interest and importance attaches to the cotton cultivation of Ferghana, where, as in the southern United States,

Cotton is King. At the time of the Russian conquest only short-fibred native cotton was grown; later attempts were made without success to grow Sea-Island, but the introduction of American Upland proved more successful. In 1911 more than 1,000,000 acres of Turkistan were under cotton—a very important source of supply for Russian mills. Special interest attaches, also, to the vine, and fruit-tree orchards of favoured Turkistan.

After the 1917 Revolution several parts of Russian Turkistan assumed independence temporarily, but, as Soviet influence spread, became Socialist Soviet Republics. These were reorganized and their boundaries rearranged on a national basis and there came into existence three new republics—Uzbekistan, Turkmenistan and Tajikistan—each a member of the U.S.S.R.

*Uzbekistan* (Uzbek Socialist Soviet Republic) was formed in 1924 from parts of Khiva and Bukhara and the provinces of Samarqand and Bukhara. The Uzbeks, who form the majority of the population, are Sunni Mahommedans and were the ruling race over much of Central Asia till the arrival of the Russians. The area of the republic is only 66,392 square miles, but it has a population of over 5,000,000, of whom more than a quarter are urban dwellers. Towns include the capital, Tashkent, Bukhara, Khiva, Kokand and Samarqand. These are essentially irrigated settlements.

Tashkent (491,000 in 1933) is the largest city in Asiatic Russia and ranks eighth in size amongst all the cities of the U.S.S.R. Samarqand (Samarkand), with 155,000 people, is also a large city; it combines ancient and modern in the presence of the native town on the east and the Russian town on the west with the fortress in the centre. Khoqand (Kokand) (85,000) is typical of all these irrigation-oasis settlements; its position may be compared with the cities of the Tarim Basin. The oasis of Khiva has over half a million people.

*Turkmenistan* (Turkoman Socialist Soviet Republic) was formed in 1924 from the old Trans-Caspian Province and neighbouring parts of Khiva and Bukhara. The people are Turkoman tribes who speak allied dialects of the Turkoman language and are Sunni Mahommedans. They number 1,269,000 (1933) and the country has an area of 189,603 square miles. The capital is Ashkhabad ('Ashqabad), another large town being Merv.

*Tajikistan* (Tajik Socialist Soviet Republic) was formed in 1929 of those portions of Bukhara and Turkistan inhabited mainly by Tajiks, who speak a language allied to Iranian. The

<sup>1</sup> The ancient importance of Bukhara has been noted in Part I; its present importance see F. M. Bailey, 'A Visit to Bokhara in 1919' *Geog. Journal*, Vol. LVII, 1921, pp. 75-95.

yans and numbered 1,333,000 in 1933. The area of the y is 55,545 square miles. The capital is Stalinabad (formerly Dushambe) and the state is remarkable for the development of motor roads. Stalinabad is now not only linked by rail with Tashkent but has regular air services. During the Czarist era literacy was only 0.5 per cent. It has now risen to 60 per cent. The eastern part of this republic is Badakhshan, lying against the Pamirs. The Russians have recently carried out extensive searches for minerals, with important results.

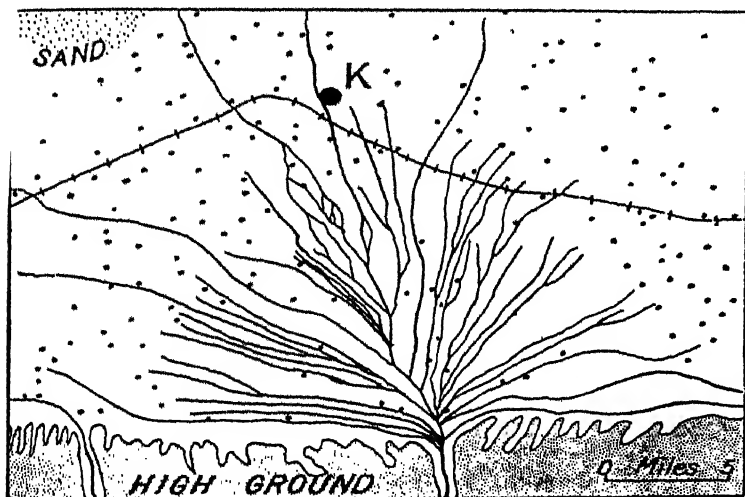


FIG. 349.—Irrigation canals of the Khoqand Oasis.

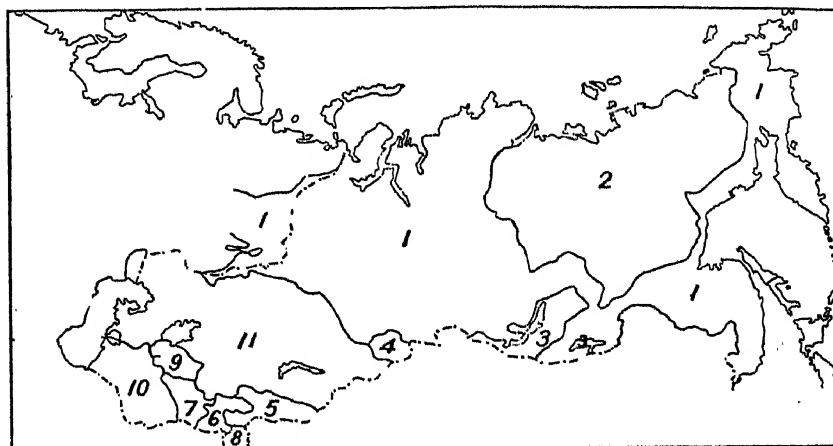
(After d'Almeida.)

Dots = Settlements.

**Foreign Relationships of Turkistan.** The natural outlet for Turkistan is to European Russia. There is direct rail communication from Leningrad and Moscow to Tashkent and so to Samarkand. There is also communication by the Caspian Sea and the Transcaspian Railway. On the south-south-east, east and north-east, Turkistan is shut in by mountains. The trade with Persia and Afghanistan is limited, that with Chinese Turkistan and Siberia still more so; hence the trade of Russian Turkistan could naturally be with Russia apart from political ties.

The whole area now has a special significance for Soviet Russia. The Soviet Union has an area of  $8\frac{1}{2}$  million square miles and over 165 million inhabitants. Yet it is only in this southern corner that tropical crops can be cultivated, and an economically independent Russia falls to the ground without

an assured supply of products of tropical or sub-tropical origin. Hence the very definite policy of improving communication with Turkistan, educating the people and encouraging them to draw their foodstuffs from Siberia and to use their own land for the growing of cotton for export to Moscow's mills. As typical of efforts made in this direction, it is said that rubber has been successfully grown under specially adapted conditions in Turkistan. The Turkistan-Siberian (Turk-Sib) Railway was planned to play, and is playing, a large part in the free interchange of produce. There is a little river traffic on the Sir Darya, and on the lower Amu Darya as well as on the Aral Sea.



1. The Russian Republic (R.S.F.S.R.).
2. Yakut Autonomous Republic.
3. Mongolo-Buriat Autonomous Republic.
4. Oirat Autonomous Region.
5. Kirghiz Autonomous Republic.

6. Tajik S.S.R.  
(With 8. Badakhshan Aut. Reg.)
7. Uzbek S.S.R.
9. Kara-Kalpak Autonomous Republic.
10. Turkoman S.S.R.
11. Kazak Autonomous Republic.

FIG. 350.—The administrative divisions of Asiatic Russia, 1933.

Note.—The Autonomous Republics and Autonomous Region mentioned above are all within R.S.F.S.R.; the other three are constituent republics of the Union.

According to the Census of 1926, the populations were as follows:—

Russian Republic:	
Province of Siberia . . . . .	8,690,990
Extreme East Region . . . . .	1,875,254
Ural Territory: Trans-Ural . . . . .	3,205,430
Tobolsk Sub-Region . . . . .	191,964
Yakut Aut. Republic . . . . .	278,809
Mongolo-Buriat Aut. Republic . . . . .	491,266
Oirat Aut. Region (277,251) (included in Siberia) . . . . .	—
Kirghiz Aut. Republic . . . . .	993,115
Tajik S.S.R. (formed in 1929) . . . . .	—
Uzbek S.S.R. . . . .	5,274,998
Kara-Kalpak Aut. Republic . . . . .	304,643
Turkoman S.S.R. . . . .	991,952
Kazak Aut. Republic . . . . .	6,491,732

Approximate population of Asiatic Russia in 1926: 29 million.



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The numbers in black type refer to passages that contain an important mention of the subject of reference. Conventional abbreviations are used to save space, as, *e.g.* Mts. = Mountains; Penin. = Peninsula; Ry. = Railway, &c.

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